```
ln[1] = q = q0 * Exp[I * (k * x + w * t)];
     qjn = q0 * Exp[I * (k * xj + w * tn)];
     qjbar = Integrate [q, \{x, xj - dx/2, xj + dx/2\}]/(dx);
     qjnbar = qjbar /. t \rightarrow tn;
     MA = qjn / qjnbar;
     qntbar = Integrate[q, {t, tn, tn + dt}] / (dt);
     qjntbar = qntbar /. x \rightarrow xj;
     MtA = qjntbar / qjn;
     qjphn = q0 * Exp[I * (k * (xj + dx/2) + w * tn)];
     RA = Simplify[MA * qjphn / (qjn)];
     vmultG = H + H^3/3*k^2;
     GnA = -U * RA / vmultG;
     GGA = RA / vmultG;
     GcA = -U * H / vmultG ;
     fn1A = H * vh + U * eh;
     fn1A = fn1A /. vh \rightarrow (GGA*Gca + GnA*eca) /. eh \rightarrow RA*eca;
     fn1Gca0A = fn1A / . Gca \rightarrow 0 ;
     fn1eca0A = fn1A/. eca \rightarrow 0;
     fnnA = Simplify[fn1Gca0A / eca];
     fnGA = fn1eca0A / Gca;
     fncA = H * GcA;
     fG1A = U*Gh + U*H*vh + g*H*eh;
     \texttt{fGlA} = \texttt{fGlA} \ / . \ \texttt{vh} \ \rightarrow \ (\texttt{GGA} \star \texttt{Gca} \ + \ \texttt{GnA} \star \texttt{eca}) \ \ / . \ \ \texttt{eh} \ \rightarrow \ \texttt{RA} \star \texttt{eca} \ / . \ \ \texttt{Gh} \ \rightarrow \ \texttt{RA} \star \texttt{Gca} \ ;
     fG1Gca0A = fG1A / . Gca \rightarrow 0 ;
     fGleca0A = fGlA /. eca \rightarrow 0;
     fGnA = Simplify[fG1Gca0A / eca];
     fGGA = Simplify[fGleca0A / Gca];
     fGcA = U * H * GcA;
     FnnA = -MtA * dt / dx * (1 - Exp[-I * k * dx]) * fnnA;
     FnGA = -MtA * dt / dx * (1 - Exp[-I * k * dx]) * fnGA;
     FGnA = -MtA * dt / dx * (1 - Exp[-I * k * dx]) * fGnA;
     FGGA = -MtA * dt / dx * (1 - Exp[-I * k * dx]) * fGGA;
     MatA = {{FnnA, FnGA}, {FGnA, FGGA}};
     EA = \{\{1, 0\}, \{0, 1\}\} + MatA;
```

```
wAp = U * k + \frac{\sqrt{3} k \sqrt{g H (3 + H^2 k^2)}}{3 + H^2 k^2};
wAm = U * k - \frac{\sqrt{3} k \sqrt{g H (3 + H^2 k^2)}}{3 + H^2 k^2};
ln[37]:= M = 1;
    Merr = Series[M - MA, \{dx, 0, 4\}];
    Rm = 1;
    Rmerr = Series[Rm - RA, {dx, 0, 4}];
    Rp = Exp[I * k * dx];
    Rperr = Series[Rp - RA, {dx, 0, 4}];
    Ru = (1 + Exp[I*k*dx])/2;
     Ruerr = Series \left[ Ru - Exp \left[ I * k * dx / 2 \right], \left\{ dx, 0, 4 \right\} \right];
     Gold = H - H^3/3 * (2 * Cos[k * dx] - 2) / dx^2;
     GG2 = Simplify[Ru / Gold];
    GG2err = Series[GG2 - GGA, {dx, 0, 5}];
     Gn2 = Simplify[-U*Ru / Gold];
     Gn2err = Series[Gn2 - GnA, {dx, 0, 5}];
In[50]:= Text[Row[{"M || ", M}]]
     Text[Row[{"M || ", TeXForm[M]}]]
     Text[Row[{"M error || ", TeXForm[Merr]}]]
     Text[Row[{"M error || ", Merr}]]
     Text[" "]
     Text[Row[{"Rm || ", Rm}]]
     Text[Row[{"Rm || ", TeXForm[Rm]}]]
     Text[Row[{"Rm error || ", Rmerr}]]
    Text[Row[{"Rm error || ", TeXForm[Rmerr]}]]
     Text[" "]
     Text[Row[{"Rp || ", Rp}]]
    Text[Row[{"Rp || ", TeXForm[Rp]}]]
     Text[Row[{"Rp error || ", Rperr}]]
     Text[Row[{"Rp error || ", TeXForm[Rperr]}]]
    Text[" "]
     Text[Row[{"GG2 || ", GG2}]]
     Text[Row[{"GG2 || ", TeXForm[GG2]}]]
     Text[Row[{"GG2 error || ", GG2err}]]
     Text[Row[{"GG2 error || ", TeXForm[GG2err]}]]
     Text[" "]
     Text[Row[{"Gn2 || ", Gn2}]]
     Text[Row[{"Gn2 || ", TeXForm[Gn2]}]]
     Text[Row[{"Gn2 error || ", Gn2err}]]
     Text[Row[{"Gn2 error || ", TeXForm[Gn2err]}]]
```

Out[50]=  $M \parallel 1$ 

Out[51]=  $M \parallel 1$ 

Out[53]=  $M \ error \ || \ -\frac{k^2 \ dx^2}{24} - \frac{7 \ k^4 \ dx^4}{5760} + O[dx]^5$ 

Out[54]=

Out[55]=  $Rm \parallel 1$ 

Out[56]=  $Rm \parallel 1$ 

Out[57]= Rm error  $|| -\frac{1}{2} i k dx + \frac{k^2 dx^2}{12} + \frac{k^4 dx^4}{720} + O[dx]^5$ 

Out[59]=

Out[60]=  $Rp \mid \mid e^{i dx k}$ 

Out[61]=  $Rp \parallel e^{i \cdot text} dx \ k$ 

Out[62]= Rp error  $\|\frac{i k dx}{2} - \frac{5 k^2 dx^2}{12} - \frac{1}{6} i k^3 dx^3 + \frac{31 k^4 dx^4}{720} + O[dx]^5$ 

Out[63]= Rp error  $\| \frac{i \det\{dx\} k}{2} - \frac{5 \det\{dx\}^2}{2}$ 

 $k^2_{12}-\frac{1}{6} i \text{ } k^3 +\frac{31 \text{ } 4 k^4}{720}+O\left(\frac{4x}{5}\right)$ 

Out[64]=

Out[65]= 
$$GG2 \parallel \frac{1+e^{i dx k}}{2\left(H-\frac{2 H^3 (-1+Cos[dx k])}{3 dx^2}\right)}$$

$$\text{Out}_{[67]} = GG2 \ error \ || \ \frac{\left(-6\,k^2-H^2\,k^4\right) dx^2}{4\,H\left(3+H^2\,k^2\right)^2} - \frac{i\left(6\,k^3+H^2\,k^5\right) dx^3}{8\,H\left(3+H^2\,k^2\right)^2} + \frac{\left(144\,k^4+45\,H^2\,k^6+4\,H^4\,k^8\right) dx^4}{240\,H\left(3+H^2\,k^2\right)^3} - \frac{i\left(-54\,k^5+H^4\,k^9\right) dx^5}{480\,H\left(3+H^2\,k^2\right)^3} + O[dx]^6 + O[$$

Out[68]= GG2 error |

 $\label{eq:left} $$ \frac{dx}^2 \left(-H^2 k^4-6 k^2\right)}{4 H\left(-H^2 k^2+3\right)^2}-\frac{i \left(-H^2 k^5+6 k^2\right)}{4 H\left(-H^2 k^5+6 k^2\right)^2}-\frac{i \left(-H^2 k^5+6 k^2\right)}{4 H\left(-H^2 k^5+6 k^2\right)^2}-\frac{i \left(-H^2 k^5+6 k^2\right)^2}{4 H\left(-H^2 k^2\right)^2}-\frac{i \left(-H^2 k^5+6 k^2\right)^2}{4 H\left(-H^2 k^5+6 k^2\right)^2}-\frac{i \left(-H^2 k^5+6 k^2\right)^2}{4 H\left(-H^2 k^5+6 k^2\right)^2}-\frac{i \left(-H^2 k^5+6 k^2\right)^2}{4 H\left(-H^2 k^5+6 k^2\right)^2}+\frac{i \left(-H^2 k^5+6 k^2\right)^2}{4 H\left(-H^2 k^5+6 k^2\right)^2}+\frac{i \left(-H^2 k^5+6 k^2\right)^2}{4 H\left(-H^2 k^5+6 k^2\right)^2}+\frac{i \left(-H^2 k^2 k^2\right)^2}{4 H\left(-H^2 k^2\right)^2}+\frac{i \left(-H^2 k^2 k^2\right)^2}{4 H\left(-H^2$  $k^3\right){8 H \left(H^2 k^2+3\right)^2}+\frac{dx}^4 \left(H^4 k^8+45 H^2\right)$  $k^6+144 k^4\right)$ {240 H \left(H^2 k^2+3\right)^3}-\frac{i \text{dx}^5 \left(H^4)}  $k^9-54 \ k^5 \right\} \{480 \ H \ \left(\frac{480 \ H \ (H^2 \ k^2+3 \right)^3}{480 \ H \ (\text{text} \ dx}^6 \right) = 0$ 

Out[69]=

Out[70]= 
$$Gn2 \mid \mid -\frac{(1+e^{i\,dx\,k})\,U}{2\left(H-\frac{2\,H^3\,(-1+Cos[dx\,k])}{3\,dx^2}\right)}$$

 $Out[71] = Gn2 \parallel -\frac{U \left(1 + e^{i \left(x\right) k}\right)}{2 \left(1 + e^{i \left(x\right) k}\right)} \left(1 + e^{i \left(x\right) k}\right) \left(1 + e^{i \left(x\right)$ 

```
\frac{\left(6\,k^{2}+H^{2}\,k^{4}\right)\,U\,dx^{2}}{4\,H\left(3+H^{2}\,k^{2}\right)^{2}}+\frac{i\left(6\,k^{3}+H^{2}\,k^{5}\right)\,U\,dx^{3}}{8\,H\left(3+H^{2}\,k^{2}\right)^{2}}-\frac{\left(\left(144\,k^{4}+45\,H^{2}\,k^{6}+4\,H^{4}\,k^{8}\right)\,U\right)dx^{4}}{240\left(H\left(3+H^{2}\,k^{2}\right)^{3}\right)}+\frac{i\left(-54\,k^{5}+H^{4}\,k^{9}\right)\,U\,dx^{5}}{480\,H\left(3+H^{2}\,k^{2}\right)^{3}}+O[dx]^{6}
Out[72]= Gn2 error ||
Out[73]= Gn2 error |
                            k^5+6 k^3\right) \{8 + \left(\frac{4 + 4 \cdot k^2 + 3 \cdot ight}{2} - \frac{4 \cdot ight}{2} - \frac{4 \cdot ight}{4} \right) \} \{8 + \frac{4 \cdot ight}{4} + \frac{4 \cdot ight}{4}
                                        H^2 k^6+144 k^4 \right) + \frac{1}{240} \left( H \left( H^2 k^2 + 3 \right)^3 \right) + \frac{1}{240} \left( H^2 k^2 + 3 \right)^3 \right) + \frac{1}{240} \left( H^2 k^2 + 3 \right)^3 \right) + \frac{1}{240} \left( H^2 k^2 + 3 \right)^3 \left( H^2 k^2 + 3 \right)^3 \right) + \frac{1}{240} \left( H^2 k^2 + 3 \right)^3 \left( H^2 k
                                         U \left( H^4 k^9 - 54 k^5 \right) \left( H^2 k^2 + 3 \right)^3 + O\left( \left( t x \right)^6 \right) 
  ln[74] = KurF = (fm*ap - fp*am + am*ap*(qp - qm)) / (ap - am);
                     KurFWS = KurF /. ap \rightarrow (U + Sqrt[g * H]) /. am \rightarrow (U - Sqrt[g * H]);
                     KurFWSeta =
                               KurFWS /. fp \rightarrow (H * v + U * Rpp * n) /. fm \rightarrow (H * v + U * Rmp * n) /. qp \rightarrow Rpp * n /.
                                     qm \rightarrow Rmp * n;
                     KurFWSeta = KurFWSeta / . v \rightarrow (GGp * G + Gnp * n);
                     Kfnnp = FullSimplify[KurFWSeta /. G \rightarrow 0 /. n \rightarrow 1];
                     KfnGp = FullSimplify[KurFWSeta /. n \rightarrow 0 /. G \rightarrow 1];
                     Kfnn = Kfnnp /. Rpp → Rp /. Rmp → Rm /. GGp → GG2 /. Gnp → Gn2;
                     KfnG = KfnGp /. Rpp → Rp /. Rmp → Rm /. GGp → GG2 /. Gnp → Gn2;
                     Fnn2 = -dt * (1 - Exp[-I * k * dx]) / dx * Kfnn;
                     Fnn2TA = Series[Fnn2 - FnnA, {dx, 0, 3}, {dt, 0, 3}];
                     Fnn2TAr = Refine[Fnn2TA, \{k > 0, U > 0, H > 0, g > 0\}];
                     FnG2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfnG;
                      FnG2TA = Series[FnG2 - FnGA, {dx, 0, 3}, {dt, 0, 3}];
                      FnG2TAr = Refine[FnG2TA, \{k > 0, U > 0, H > 0, g > 0\}];
                     \texttt{KurFWSG} = \texttt{KurFWS} \ / \ . \ \texttt{fp} \ \rightarrow \ (\texttt{U} * \texttt{Rpp} * \texttt{G} \ + \ \texttt{U} * \texttt{H} * \texttt{v} \ + \ \texttt{g} * \texttt{H} * \texttt{Rpp} * \texttt{n}) \ / \ .
                                               fm \rightarrow (U*Rmp*G + U*H*v + g*H*Rmp*n) /. qp \rightarrow Rpp*G /. qm \rightarrow Rmp*G;
                     KurFWSG = KurFWSG / . v \rightarrow (GGp * G + Gnp * n);
                     KfGnp = FullSimplify[KurFWSG /. G \rightarrow 0 /. n \rightarrow 1];
                     KfGGp = FullSimplify[KurFWSG /. n \rightarrow 0 /. G \rightarrow 1];
                     KfGn = KfGnp / . Rpp → Rp / . Rmp → Rm / . GGp → GG2 / . Gnp → Gn2;
                     \texttt{KfGG} \; = \; \texttt{KfGGp} \; / \; . \; \mathsf{Rpp} \; \rightarrow \; \mathsf{Rp} \; \; / \; . \; \; \mathsf{Rmp} \; \rightarrow \; \mathsf{Rm} \; \; / \; . \; \; \mathsf{GGp} \; \rightarrow \; \mathsf{GG2} \; \; / \; . \; \; \mathsf{Gnp} \; \rightarrow \; \mathsf{Gn2} \; ;
                     FGn2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfGn;
                     FGn2TA = Series[FGn2 - FGnA, {dx, 0, 3}, {dt, 0, 3}];
                     FGn2TAr = Refine[FGn2TA, \{k > 0, U > 0, H > 0, g > 0\}];
                      fGG2 = U * H * GG2 + U / 2 * (Rm + Rp) - (Sqrt[g * H]) / (2) * (Rp - Rm);
                      FGG2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfGG;
                      FGG2TA = Series[FGG2 - FGGA, {dx, 0, 4}, {dt, 0, 3}];
                      FGG2TAr = Refine[FGG2TA, \{k > 0, U > 0, H > 0, g > 0\}];
                     Fmat2 = {{Fnn2, FnG2}, {FGn2, FGG2}};
                     Emat2 = IdentityMatrix[2] + Fmat2;
                     Eerr = Series [Emat2 - EA, \{dx, 0, 4\}, \{dt, 0, 4\}];
```

```
EigvFmat2 = Eigenvalues[Fmat2];
     RKStep = Log[1 + EigvFmat2] / (I * dt);
     RKstepTay = Series[RKStep, {dx, 0, 4}, {dt, 0, 4}];
     RKstepTayr = Simplify[-RKstepTay - \{wAp, wAm\}, \{k > 0, H > 0, g > 0, U > 0\}];
     Text[Row[{" -Sqrt(gH) < U < Sqrt(gH)"}]]</pre>
     Text[" "]
     Text[Row[{"Fnn || ", Kfnnp}]]
     Text[Row[{"Fnn || ", TeXForm[Kfnnp]}]]
     Text[Row[{"Fnn error ||
                                ", Fnn2TAr}]]
     Text[Row[{"Fnn error || ", TeXForm[Fnn2TAr]}]]
     Text[" "]
     Text[Row[{"FnG || ", KfnGp}]]
     Text[Row[{"FnG || ", TeXForm[KfnGp]}]]
     Text[Row[{"FnG error || ", FnG2TAr}]]
     Text[Row[{"FnG error || ", TeXForm[FnG2TAr]}]]
     Text[" "]
     Text[Row[{"FGn || ", KfGnp}]]
     Text[Row[{"FGn || ", TeXForm[KfGnp]}]]
     Text[Row[{"FGn error || ", FGn2TAr}]]
     Text[Row[{"FGn error || ", TeXForm[FGn2TAr]}]]
     Text[" "]
     Text[Row[{"FGG ||
                          ", KfGGp}]]
     Text[Row[{"FGG || ", TeXForm[KfGGp]}]]
     Text[Row[{"FGG error || ", FGG2TAr}]]
     Text[Row[{"FGG error || ", TeXForm[FGG2TAr]}]]
     Text[" "]
     Text[" "]
     Text[Row[{"Omega error || ", RKstepTayr}]]
     Text[Row[{"Omega error || ", TeXForm[RKstepTayr]}]]
     Text[" "]
     Text[Row[{"EA ||
                        ", EA}]]
     Text[Row[{"EA || ", TeXForm[EA]}]]
     Text[Row[{"Eerr || ", Eerr}]]
     Text[Row[{"Eerr || ", TeXForm[Eerr]}]]
Out[108]= -Sqrt(gH) < U < Sqrt(gH)
Out[109]=
```

$$\text{Out[110]=} \quad Fnn \quad || \quad \frac{1}{2} \left( 2 \; Gnp \; H + Rpp \left( -\sqrt{g \; H} \right. \right. + U \right) + Rmp \left( \sqrt{g \; H} \right. + U \right) \right)$$

 $\label{eq:output} \begin{tabular}{ll} $$ Output = Fnn & \frac{1}{2} \left( \frac{1}{2} \left( \frac{Rmp}{ett(sqrt\{g H}+U\right)) + \frac{Rmp}{ett(u-sqrt\{g H}+u)} \right) + \frac{1}{2} \left( \frac{1}{2} \left( \frac{1}{2} \left( \frac{1}{2} \right) + \frac{1}{2} \left( \frac{1}{2} \left( \frac{1}{2} \left( \frac{1}{2} \right) + \frac{1}{2} \left( \frac{1}{2} \left( \frac{1}{2} \left( \frac{1}{2} \right) + \frac{1}{2} \left( \frac{1$ 

$$\begin{array}{ll} \text{Out} \text{[112]=} & Fnn \; error \; \mid \mid \; \left( -\frac{\left( H^2 \; k^3 \; U \; w \right) \; dt^2}{2 \left( 3 + H^2 \; k^2 \right)} - \frac{i \; H^2 \; k^3 \; U \; w^2 \; dt^3}{6 \left( 3 + H^2 \; k^2 \right)} + O[dt]^4 \right) + \left( -\frac{1}{2} \left( \sqrt{\; g \; H} \; \; k^2 \right) dt + O[dt]^4 \right) dx \; + \\ & \left( \frac{i \left( 9 \; H^2 \; k^5 + 2 \; H^4 \; k^7 \right) \; U \; dt}{12 \left( 3 + H^2 \; k^2 \right)^2} + O[dt]^4 \right) dx^2 \; + \left( \frac{1}{24} \; \sqrt{\; g \; H} \; \; k^4 \; dt + O[dt]^4 \right) dx^3 \; + O[dx]^4 \\ \end{array}$$

Out[113]= Fnn error |

Out[114]=

Out[115]= FnG || GGp H

Out[116]=  $FnG \parallel \text{text}\{GGp\} H$ 

$$\text{Out} \text{[117]=} \quad FnG \; error \; \mid \mid \; \left( -\frac{3 \; (k \; w) \; dt^2}{2 \; (3 + H^2 \; k^2)} - \frac{i \; k \; w^2 \; dt^3}{2 \; (3 + H^2 \; k^2)} + O[dt]^4 \right) \\ + \left( \frac{i \; (6 \; k^3 + H^2 \; k^5) \; dt}{4 \; (3 + H^2 \; k^2)^2} + O[dt]^4 \right) dx^2 \\ + O[dx]^4 + O[dx$$

 $\label{eq:continuous} $$ \operatorname{FnG error} \| \left(-\frac{3 \text{dt}}^2 (k w)}{2 \left(\frac{4 v}{2 k^2+3\right)}-\frac{i \text{dt}}^3 k w^2}{2 \left(\frac{4 v}{4 v}\right)} + \operatorname{ch}(\frac{4 v}{2 k^2+3\right)} - \operatorname{ch}(\frac{4 v}{2 k^2+3\right)} + \operatorname{ch}(\frac{4 v}{4 v}) + \operatorname{ch}(\frac{4 v}{4 v})$ 

Out[119]=

$$\text{Out[120]=} \quad FGn \quad || \quad \frac{1}{2} \left( g \; H \; (Rmp + Rpp) + \left( 2 \; Gnp \; H + \sqrt{g \; H} \; \; (Rmp - Rpp) \right) U \right)$$

Out[121]=  $FGn \parallel$ 

$$\begin{array}{l} \text{Out} \text{[122]=} \quad FGn \; error \; || \; \left( -\frac{\left( k \left( 3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2 \right) w \right) dt^2}{2 \left( 3 + H^2 \, k^2 \right)} - \frac{i \, k \left( 3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2 \right) w^2 \, dt^3}{6 \left( 3 + H^2 \, k^2 \right)} + O[dt]^4 \right) + \left( -\frac{1}{2} \left( \sqrt{g \, H} \; \; k^2 \, U \right) dt + O[dt]^4 \right) dx \\ + \left( \frac{i \left( 18 \, g \, H \, k^3 + 12 \, g \, H^3 \, k^5 + 2 \, g \, H^5 \, k^7 - 18 \, k^3 \, U^2 - 3 \, H^2 \, k^5 \, U^2 \right) dt}{12 \left( 3 + H^2 \, k^2 \right)^2} + O[dt]^4 \right) dx^2 \\ + \left( \frac{1}{24} \sqrt{g \, H} \; k^4 \, U \, dt + O[dt]^4 \right) dx^3 + O[dx]^4 \\ \end{array}$$

Out[123]= FGn error ||

 $\label{left} $$\left(-\frac{\det(t)^2 \left(t + \frac{t}^2 \left(t + \frac{t}^2 \right)^2 \left(t +$ 

Out[124]=

Out[125]= FGG 
$$\parallel \frac{1}{2} \left( \sqrt{g H} Rmp - \sqrt{g H} Rpp + (2 GGp H + Rmp + Rpp) U \right)$$

 $\label{eq:continuous} $\operatorname{FGG} \parallel \frac{1}{2} \left( \operatorname{Rmp} \right) \right] + U(2 \operatorname{CGP} H+\operatorname{Rmp}+\operatorname{Rmp}) \right) $\operatorname{Continuous} (2 \operatorname{Rmp} + \operatorname{$ 

$$\begin{array}{ll} \text{Out} \text{[127]=} & FGG \; error \; || \; \left( -\frac{\left( k \left( 6 + H^2 \, k^2 \right) U \, w \right) \, dt^2}{2 \left( 3 + H^2 \, k^2 \right)} - \frac{i \, k \left( 6 + H^2 \, k^2 \right) U \, w^2 \, dt^3}{6 \left( 3 + H^2 \, k^2 \right)} + O[dt]^4 \right) \, + \\ & \left( -\frac{1}{2} \left( \sqrt{g \, H} \; \; k^2 \right) dt + O[dt]^4 \right) dx \, + \left( \frac{i \left( 36 \, k^3 \, U + 15 \, H^2 \, k^5 \, U + 2 \, H^4 \, k^7 \, U \right) \, dt}{12 \left( 3 + H^2 \, k^2 \right)^2} + O[dt]^4 \right) dx^2 \, + \\ & \left( \frac{1}{24} \, \sqrt{g \, H} \; \; k^4 \, dt + O[dt]^4 \right) dx^3 \, + \left( -\frac{i \left( 108 \, k^3 \, U + 54 \, H^2 \, k^7 \, U + 17 \, H^4 \, k^9 \, U + 2 \, H^6 \, k^{11} \, U \right) dt}{240 \left( 3 + H^2 \, k^2 \right)^3} + O[dt]^4 \right) dx^4 \, + O[dx]^5 \end{array}$$

Out[128]= FGG error ||

 $\left(-\frac{t}{2 \ker\{dt\}^2 \left(H^2 k^2+6\right)}}{2 \ker\{dt\}^2 \left(H^2 k^2+6\right)}}{2 \ker\{dt\}^3 k U w^2 + h^2 \left(H^2 k^2+3\right)}$  $\left(H^2 k^2+6\right)\right)$  $\left(\frac{dt}{dt}\right) \left(\frac{dt}{dt}\right) \left(\frac{dt}{dt}\right)$  $H^2 U k^5 + 36 U k^3 \right) \left( \frac{4^2 k^2 + 3\right)^2}{+0} \left( \frac{dt}^4 \right) \left( \frac{dt}^4 \right) \left( \frac{dt}^4 \right) \left( \frac{dt}^3 \right) \right) \left( \frac{dt}^3 \right) \left($  $\label{left(frac{1}{24} \sqrt{g H} k^4 \text{text{dt}}+O\left(\frac{1}{24}\right)+\frac{d^2}{24} + O\left(\frac{1}{24}\right)+\frac{d^2}{24} + O\left(\frac{1}{24}\right)+O\left(\frac{1}$ \left(-\frac\i \left(2 H^6 U k^\{11\}+17 H^4 U k^9+54 H^2 U k^7+108 U k^5\right)  $\text{text}_{dt}^{240} \left( \frac{H^2 k^2+3\right)^3}+O\left( \frac{dt}^4\right)\right) + O\left( \frac{dt}^4\right) + O\left( \frac{dt}^4\right)$ 

Out[129]=

Out[130]=

Out[131]= Omega error || 
$$\left\{ \frac{i \left[ \sqrt{3} \text{ k} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right] + 3 \, \text{k} \, \text{U} + \text{H}^2 \, \text{k}^2 \, \text{U}}{2 \, (3 + \text{H}^2 \, \text{k}^2)^2} - \frac{1}{3 \, (3 + \text{H}^2 \, \text{k}^2)^2} \right. \\ \left. \left( k^3 \left( \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + \left( 3 + \text{H}^2 \, \text{k}^2 \right) \, \text{U} \right) \left( 3 \, g \, \text{H} + \text{U} \, \left( 2 \, \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + \left( 3 + \text{H}^2 \, \text{k}^2 \right) \, \text{U} \right) \right) \right) dt^2 - \\ \frac{1}{4 \, (3 + \text{H}^2 \, \text{k}^2)^3} i \, k^4 \left( \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + \left( 3 + \text{H}^2 \, \text{k}^2 \right) \, \text{U} \right) \left( 3 \, g \, \left( \sqrt{3} \, \text{H} \, \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + 9 \, \text{H} \, \text{U} + 3 \, \text{H}^3 \, \text{k}^2 \, \text{U} \right) + \\ \left. U^2 \left( \text{H}^4 \, \text{k}^4 \, \text{U} + 9 \left( \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + \text{U} \right) + 3 \, k^2 \left( \sqrt{3} \sqrt{g \, \text{H}^5 \, (3 + \text{H}^2 \, \text{k}^2)} \right) + 2 \, \text{H}^2 \, \text{U} \right) \right) dt^3 + \\ \frac{1}{5 \, (3 + \text{H}^2 \, \text{k}^2)^3} k^5 \left( \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + \left( 3 + \text{H}^2 \, \text{k}^2 \right) \text{U} \right) \\ \left( 9 \, g^2 \, \text{H}^2 + 6 \, g \, \text{H} \, \text{U} \left( 2 \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + 3 \, (3 + \text{H}^2 \, \text{k}^2) \, \text{U} \right) + \\ \left. U^3 \left( 12 \, \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + 9 \, \text{U} + \text{H}^4 \, k^4 \, \text{U} + 2 \, k^2 \left( 2 \sqrt{3} \sqrt{g \, \text{H}^5 \, (3 + \text{H}^2 \, k^2)} \right) + 3 \, \text{H}^2 \, \text{U} \right) \right) \right) dt^4 + \\ O[\text{dt}]^5 \right) + \left( -\frac{1}{4} \, i \, k^2 \left( 2 \sqrt{g \, \text{H}} + \frac{\sqrt{3} \, \text{U}}{\sqrt{3 + \text{H}^2 \, k^2}} \right) + \sqrt{3} \, \text{U} \right) \left( 3 \, g \, \text{H} + \text{U} \left( 2 \, \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, \text{k}^2)} \right) + \left( 3 + \text{H}^2 \, \text{k}^2 \right) \text{U} \right) dt + \\ \frac{1}{4 \, (3 + \text{H}^2 \, k^2)^{3/2}} i \, k^4 \left( 2 \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, k^2)} \right) + \sqrt{3} \, \text{U} \right) \left( 3 \, g \, \text{H} + \text{U} \left( 2 \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, k^2)} \right) + \left( 3 + \text{H}^2 \, k^2 \right) \text{U} \right) dt^2 - \\ \frac{1}{4 \, (3 + \text{H}^2 \, k^2)^{3/2}} i \, k^4 \left( 2 \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, k^2)} \right) + \sqrt{3} \, \text{U} \right) \left( 3 \, g \, \text{H} + \text{U} \left( 2 \sqrt{3} \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, k^2)} \right) + \left( 3 + \text{H}^2 \, k^2 \right) \text{U} \right) dt^2 - \\ \frac{1}{4 \, (3 + \text{H}^2 \, k^2)^{3/2}} i \, k^4 \left( 2 \sqrt{g \, \text{H} \, (3 + \text{H}^2 \, k^2)} \right) +$$

$$\begin{split} &U^2\left(H^4\,k^4\,U + 9\left(\sqrt{3}\,\sqrt{g\,H}\left(3 + H^2\,k^2\right) + U\right) + 3\,k^2\left(\sqrt{3}\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 2\,H^2\,U\right)\right)\right)\right)\\ &dt^3 - \frac{1}{4(3 + H^2\,k^2)^2}\,k^6\left(2\,\sqrt{g\,H}\left(3 + H^2\,k^2\right) + \sqrt{3}\,U\right)\\ &\left(9\,g^2\,H^2 + 6\,g\,H\,U\left(2\,\sqrt{3}\,\sqrt{g\,H}\left(3 + H^2\,k^2\right) + 9\,U + H^4\,k^4\,U + 2\,k^2\left(2\,\sqrt{3}\,\sqrt{g\,H^5}\left(3 + H^2\,k^2\right) + 3\,H^2\,U\right)\right)\right)\right)dt^4 + \\ &U^3\left(12\,\sqrt{3}\,\sqrt{g\,H}\left(3 + H^2\,k^2\right) + 9\,U + H^4\,k^4\,U + 2\,k^2\left(2\,\sqrt{3}\,\sqrt{g\,H^5}\left(3 + H^2\,k^2\right) + 3\,H^2\,U\right)\right)\right)dt^4 + \\ &\left(0\,dU^3\right)^3dx + \left(-\left(\left(k^3\left(12\,\sqrt{3}\,g\,H\left(4 + H^2\,k^2\right) + 9\,U + H^4\,k^4\,U + 2\,k^2\left(2\,\sqrt{3}\,\sqrt{g\,H^5}\left(3 + H^2\,k^2\right) + 3\,H^2\,U\right)\right)\right)\right)dt^4 + \\ &\left(k^2\left(16\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) - 3\,\sqrt{3}\,U\right) + k^4\,U^2\left(16\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) - 3\,\sqrt{3}\,U^4\right) + \\ &\left(k^2\left(16\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 16\,\sqrt{g\,H^2}\left(3 + H^2\,k^2\right) - 3\,\sqrt{3}\,U^2\right)\right) + \\ &\left(4\,g\,H\left(63\,\sqrt{g\,H}\left(3 + H^2\,k^2\right) + 99\,\sqrt{3}\,U + 63\,\sqrt{3}\,H^2\,k^2\right) + \\ &\left(k^3\left(12\,\sqrt{3}\,g^2\,H^3\left(3 + H^2\,k^2\right) + 10\,\sqrt{3}\,H^4\,U\right)\right)\right)dt\right) / \left(96\,\sqrt{g\,H}\,\left(3 + H^2\,k^2\right)^{5/2}\right) + \\ &\left(k^3\left(16\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 10\,\sqrt{3}\,H^4\,U\right)\right)dt\right) + \\ &\left(k^3\left(16\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 10\,\sqrt{3}\,H^4\,U\right)\right)dt\right) + \\ &\left(k^3\left(16\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 10\,\sqrt{3}\,H^4\,U\right)\right)dt^2\right) / \left(96\,\sqrt{g\,H}\,\left(3 + H^2\,k^2\right)^{5/2}\right) + \\ &\left(k^3\left(16\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 17\,\sqrt{3}\,H^4\,U\right)\right)dt^2\right) / \left(96\,\sqrt{g\,H}\,\left(3 + H^2\,k^2\right)^{5/2}\right) + \\ &\left(k^3\left(6\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 17\,\sqrt{3}\,H^4\,U\right)\right)dt^2\right) / \left(96\,\sqrt{g\,H}\,\left(3 + H^2\,k^2\right)^{5/2}\right) + \\ &\left(4\,H^4\left(6\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 17\,\sqrt{3}\,H^4\,U\right)\right)dt^2\right) / \left(96\,\sqrt{g\,H}\,\left(3 + H^2\,k^2\right)^{5/2}\right) + \\ &\left(4\,H^4\left(6\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 17\,\sqrt{3}\,H^4\,U\right)\right)dt^2\right) / \left(96\,\sqrt{g\,H}\,\left(3 + H^2\,k^2\right)^{5/2}\right) + \\ &\left(27\left(2\,\sqrt{g^2\,H^3}\left(3 + H^2\,k^2\right) + 17\,2\,\sqrt{3}\,g^2H^2\,U + 404\,\sqrt{3}\,g^2H^4\,U + 438\,\sqrt{g^3\,H^7}\left(3 + H^2\,k^2\right)}\right)U^2 + \\ &\left(27\left(2\,\sqrt{g^2\,H^3}\left(3 + H^2\,k^2\right) + 104\,\sqrt{3}\,g^2H^0\,U + 48\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right)}\right)U^4 - \\ &\left(3\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 304\,\sqrt{3}\,g^2H^0\,U + 48\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right)}\right)U^4 - \\ &\left(9\,\sqrt{3}\,H^3\left(3 + H^2\,k^2\right) + 304\,\sqrt{3}\,g^2H^0\,U + 48\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right)}\right)U^4 - \\ &\left(16\,\sqrt{g\,H^3}\left(3 + H^2\,k^2\right) + 304\,\sqrt{3}\,g^2H^0\,U + 48\,\sqrt{g\,H^3}\left($$

$$3k^4 \left(216\sqrt{g\,H^9(3+H^2\,k^2)} + 197\sqrt{3}\,H^3\,U\right) + 2\,k^6 \left(12\sqrt{g\,H^{13}(3+H^2\,k^2)} + 31\sqrt{3}\,H^6\,U\right) + U\left(7344\sqrt{g^5\,H^5(3+H^2\,k^2)} + 432\sqrt{g\,H(3+H^2\,k^2)}\,U^4 - 81\sqrt{3}\,U^5 + k^6\,U^4\left(16\sqrt{g\,H^{13}(3+H^2\,k^2)} + 23\sqrt{3}\,H^6\,U\right) + 9\,k^2\left(400\sqrt{g^3\,H^9(3+H^2\,k^2)} + 760\sqrt{g^3\,H^7(3+H^2\,k^2)}\,U^2 + 48\sqrt{g\,H^5(3+H^2\,k^2)}\,U^4 - 9\sqrt{3}\,H^2\,U^5\right) + 9\,k^4\left(48\sqrt{g^3\,H^{13}(3+H^2\,k^2)} + 16\sqrt{g\,H^9(3+H^2\,k^2)}\,U^4 - 3\sqrt{3}\,H^4\,U^5\right) \right) \right) dt^4 + O[dt]^5 \right) dt^2 + \left( \left[i\,k^4\left(3\sqrt{3}\,(3+H^2\,k^2)\,U^3 + 4\,g\,H\left(12\sqrt{g\,H(3+H^2\,k^2)} + 6\sqrt{3}\,U + k^2\left(4\sqrt{g\,H^5(3+H^2\,k^2)} + \sqrt{3}\,H^2\,U\right)\right)\right) \right) \right) \left( 384\,g\,H(3+H^2\,k^2)^{3/2} \right) - \left( \left[k^5\left(8\sqrt{3}\,g^2\,H^2(54 + 33\,H^2\,k^2) + 5\,H^4\,k^4\right) + 3\sqrt{3}\,(3 + H^2\,k^2)^2\,U^4 + 2\,g\,H\,U \right) + k^4\left(24\sqrt{g\,H^9(3+H^2\,k^2)} + \sqrt{3}\,U\right) + 24\,k^2\left(7\sqrt{g\,H^5(3+H^2\,k^2)} + 2\sqrt{3}\,H^2\,U\right) + k^4\left(24\sqrt{g\,H^9(3+H^2\,k^2)} + 7\sqrt{3}\,H^4\,U\right) \right) \right) dt \right) \left/ \left(384\left(g\,H(3+H^2\,k^2)^{3/2}\right) - \left(i\,k^6\left(3\,k^2\left(96\sqrt{g^5\,H^9(3+H^2\,k^2)} + 380\sqrt{3}\,g^2\,H^4\,U + 224\sqrt{g^3\,H^7(3+H^2\,k^2)} + 2\sqrt{3}\,H^2\,U\right) + 2\sqrt{3}\,H^2\,U\right) + k^4\left(24\sqrt{g\,H^9(3+H^2\,k^2)} + 380\sqrt{3}\,g^2\,H^4\,U + 224\sqrt{g^3\,H^7(3+H^2\,k^2)} + 168\sqrt{3}\,g^2\,H^6\,U + 3\sqrt{3}\,g^2\,H^2\,U^3 + 8\,g\,H^3\,U^3 + 6\sqrt{3}\,H^2\,U^3\right) + k^4\left(16\sqrt{g^5\,H^{3/3}(3+H^2\,k^2)} + 168\sqrt{3}\,g^2\,H^6\,U + 3\sqrt{3}\,g^2\,H^2\,U + 3\sqrt{3}\,g^2\,H^2\,U + 3\sqrt{3}\,g^2\,H^3\,U^3 + 4\,g^2\,U^3\right) + 224\sqrt{3}\,g^2\,H^3\,U^3 + 4\,g^2\,U^3\right) + \frac{224\sqrt{3}\,g^2\,H^3\,U^3 + 4\,g^2\,U^3}{3^3\,H^3\,U^3 + 6\sqrt{3}\,g^2\,H^4\,U + 3\sqrt{3}\,U^3 + H^2\,k^2\right) + 4\sqrt{3}\,g^2\,H^3\,U^3 + 2\,g^2\,U^3\right) + \frac{2}{344\,g\,H(3+H^2\,k^2)} + 27\sqrt{3}\,U\right) \right) dt^2\right) / \left(3k^2\,H^3\,(3+H^2\,k^2) + 3\sqrt{3}\,U^3 + 2\,g\,H^3\,U^3 + 4\,g^2\,U^3\right) + \frac{2}{344\,g\,H(3+H^2\,k^2)} + 27\sqrt{3}\,g\,H^3\,U^3 + 4\,g^2\,U^3\right) + 4\sqrt{3}\,u^3 + 2\,g^2\,H^3\,U^3 + 4\sqrt{3}\,u^3\right) + \frac{2}{9}\left(160\sqrt{g^3\,H^3\,(3+H^2\,k^2)} + 3\sqrt{3}\,u^3 + 2\,g\,H^3\,U^3 + 4\sqrt{3}\,u^3\right) + 2\,g\,H^3\,U^3 + 4\sqrt{3}\,u^3 + 2\,g\,H^3\,U^3 + 4\sqrt{3}\,u^3\right) + \frac{2}{344\,g\,H(3+H^2\,k^2)} + 29\sqrt{3}\,U^3\right) dt^3 + 2\,g\,H^3\,U^3 + 2\sqrt{3}\,u^3 + 2\sqrt{3}\,$$

$$\begin{split} & \text{g III U}^* \left( [k^5 \left( 16 \sqrt{3} \text{ g}^3 \text{ H}^2 \left( 144 + 48 \text{ H}^2 \text{ k}^2 + 5 \text{ H}^4 \text{ k}^4 \right) - 75 \sqrt{3} \left( 3 + \text{H}^2 \text{ k}^2 \right)^2 \text{ U}^4 + 8 \text{ g H} \left( 3 + \text{H}^2 \text{ k}^2 \right)^2 \text{ U} \right) \\ & \left( 96 \sqrt{\text{g II} \left( 3 + \text{H}^2 \text{ k}^2 \right)} + k^2 \left( 32 \sqrt{\text{g II}^3 \left( 3 + \text{H}^2 \text{ k}^2 \right)^2} \right) + 5 \sqrt{3} \text{ II}^2 \text{ U} \right) \right) \right) / \\ & \left( 30720 \left( \text{g H} \right)^{3/2} \left( 3 + \text{H}^2 \text{ k}^2 \right)^{5/2} \right) + \frac{12}{924606 \left( \text{g H}^3 \left( 3 + \text{H}^2 \text{ k}^2 \right)} + 5 \sqrt{3} \text{ II}^2 \text{ U} \right) \right) \right) / \\ & \left( 30720 \left( \text{g H} \right)^{3/2} \left( 3 + \text{H}^2 \text{ k}^2 \right)^{5/2} \right) + \frac{12}{924606 \left( \text{g H}^3 \left( 3 + \text{H}^2 \text{ k}^2 \right)} + 16 160 \sqrt{3} \text{ g}^2 \text{ H}^4 \text{ U} + 6144 \sqrt{\text{g}^3 \text{ H}^2 \left( 3 + \text{H}^2 \text{ k}^2 \right)} \right) \text{ U}^2 - \\ & 240 \sqrt{3} \text{ g H}^3 \text{ U}^3 - 675 \sqrt{3} \text{ H}^2 \text{ U}^3 \right) + k^6 \left( 1920 \sqrt{\text{g}^3 \text{ H}^{17} \left( 3 + \text{H}^2 \text{ k}^2 \right)} + 4368 \sqrt{3} \text{ g}^2 \text{ H}^8 \text{ U} + \\ & 2048 \text{ g H}^7 \sqrt{\text{g H} \left( 3 + \text{H}^2 \text{ k}^2 \right)} \text{ U}^2 - 225 \sqrt{3} \text{ H}^6 \text{ U}^5 \right) + 27 \left( 3968 \sqrt{\text{g}^6 \text{ H}^5 \left( 3 + \text{H}^2 \text{ k}^2 \right)} \right) + \\ & 6016 \sqrt{3} \text{ g}^2 \text{ H}^2 \text{ U} - 225 \sqrt{3} \text{ U}^3 + 8 \text{ g H U}^2 \left( 256 \sqrt{\text{g H} \left( 3 + \text{H}^2 \text{ k}^2 \right)} - 15 \sqrt{3} \text{ U} \right) \right) + \\ & 3 k^4 \left( 6720 \sqrt{\text{g}^5 \text{ H}^{1/3} \left( 3 + \text{H}^2 \text{ k}^2 \right)} \right) + 14512 \sqrt{3} \text{ g}^2 \text{ H}^9 \text{ U} - 675 \sqrt{3} \text{ II}^4 \text{ U}^5 + \\ & 24 \text{ g H}^3 \text{ U}^2 \left( 256 \sqrt{\text{g H} \left( 3 + \text{H}^2 \text{ k}^2 \right)} \right) + 14512 \sqrt{3} \text{ g}^2 \text{ H}^9 \text{ U} - 675 \sqrt{3} \text{ II}^4 \text{ U}^5 + \\ & 24 \text{ g H}^3 \text{ U}^2 \left( 256 \sqrt{\text{g H} \left( 3 + \text{H}^2 \text{ k}^2 \right)} \right) - 5 \sqrt{3} \text{ U} \right) \right) \right) d \text{U} - \\ & \frac{1}{92160 \left( \left( \text{g H}^{1/3} \left( 3 + \text{H}^2 \text{ k}^2 \right) \right)} \left( 18 \sqrt{3} \text{ g}^3 \text{ H}^3 \left( 6192 + 5004 \text{ H}^2 \text{ k}^2 + 1425 \text{ H}^4 \text{ k}^4 + 140 \text{ H}^6 \text{ k}^6 \right) + \\ & \text{g H} \text{ U}^3 \left( 89856 \sqrt{\text{g H} \left( 3 + \text{H}^2 \text{ k}^2 \right)} - 5 \sqrt{3} \text{ U} \right) \right) d \text{U} - \\ & 15 \sqrt{3} \text{ H}^6 \text{ U}^3 \right) + 3 \text{ U} \left( 811 \left( 2816 \sqrt{\text{g}^5 \text{ H}^2 \left( 3 + \text{H}^2 \text{ k}^2 \right)} \right) - 25 \sqrt{3} \text{ U}^2 \right) + \\ & 3 k^2 \left( 52352 \sqrt{\text{g}^3 \text{ H}^3 \left( 3 + \text{H}^2 \text{ k}^2 \right)} - 15 \sqrt{3} \text{ H}^4 \text{ U}^3 \right) + 8 k^6 \left( 416 \sqrt{\text{g} \text{ H}^{1/3} \left( 3 + \text$$

$$\begin{array}{c} 9888\sqrt{3} \ g^2H^{10}U^3 - 75\sqrt{3} \ H^8U^7 + 16 gH^9U^4 \Big(96\sqrt{gH(3+H^2k^2)} - 5\sqrt{3} \ U\Big)\Big)dt^3 + \\ \frac{1}{92160(gH)^{10}(5+H^2k^2)^2}k^2 \Big(144\sqrt{3} \ g^4H^2 (23832 + 22104H^2k^2 + 7395H^4k^4 + 1000H^6k^6 + 40H^8k^8) + \\ 24\sqrt{3} \ g^3H^3 (893700 + 953451H^2k^2 + 376029H^4k^4 + 64744H^6k^6 + 4080H^8k^8)U^2 + \\ 3\sqrt{3} \ g^3H^3 (893700 + 953451H^2k^2) - 8505\sqrt{3} \ U - 13365\sqrt{3} \ H^2k^2 U + \\ 2gHU^3 \Big(238464\sqrt{gH(3+H^2k^2)} - 8505\sqrt{3} \ U - 13365\sqrt{3} \ H^2k^2 U + \\ 27k^4 \Big(5888\sqrt{gH^9(3+H^2k^2)} - 2855\sqrt{3} \ H^4U \Big) + 3k^6 \Big(11776\sqrt{gH^{13}(3+H^2k^2)} - 645\sqrt{3} \ H^6U \Big) + 4k^8 \Big(736\sqrt{gH^{17}(3+H^2k^2)} - 45\sqrt{3} \ H^8U \Big) \Big) + \\ 3U\Big(135\Big(33920\sqrt{g^7H^7(3+H^2k^2)} + 39424\sqrt{g^5H^3(3+H^2k^2)} \ U^2 - 45\sqrt{3} \ U^7 \Big) + \\ 36k^2 \Big(105472\sqrt{g^7H^{11}(3+H^2k^2)} + 144512\sqrt{g^5H^9(3+H^2k^2)} \ U^2 - 45\sqrt{3} \ U^7 \Big) + \\ 18k^4 \Big(60608\sqrt{g^7H^{15}(3+H^2k^2)} + 100096\sqrt{g^8H^{13}(3+H^2k^2)} \ U^2 - 225\sqrt{3} \ H^4U^7 \Big) + \\ 12k^6 \Big(9600\sqrt{g^7H^{19}(3+H^2k^2)} + 2048\sqrt{g^5H^{17}(3+H^2k^2)} \ U^2 - 75\sqrt{3} \ H^6U^7 \Big) + \\ 5k^8 \Big(384\sqrt{g^2H^{23}(3+H^2k^2)} + 2048\sqrt{g^5H^{21}(3+H^2k^2)} \ U^2 - 15\sqrt{3} \ H^8U^7 \Big) \Big) \Big) dt^4 + \\ O[dt]^3 \Big) dx^4 + O[dx]^5, \begin{cases} i \sqrt{3} k\sqrt{gH(H^{14}E^2)} + 3kU + H^2k^2 U \right) \\ 2(3H^{12}E^2)^7 + (3+H^2k^2) + (3+H^2k^2) U \Big) \\ 3gH + U\Big(-2\sqrt{3}\sqrt{gH(3+H^2k^2)} + (3+H^2k^2) U \Big) + \\ U^2\Big(-9\sqrt{3}\sqrt{gH(3+H^2k^2)} + 3(3+H^2k^2) U \Big) + \\ U^3\Big(-\sqrt{3}\sqrt{gH(3+H^2k^2)} + 9U + H^4k^4U - 3k^2\Big(\sqrt{3}\sqrt{gH^5(3+H^2k^2)} - 2H^2U \Big) \Big) dt^4 + O[dt]^5 \Big) + \\ U^3\Big(-12\sqrt{3}\sqrt{gH(3+H^2k^2)} + 9U + H^4k^4U - 4k^2U - 3k^2\Big(\sqrt{3}\sqrt{gH^5(3+H^2k^2)} + 6H^2U \Big) \Big) \Big) dt^4 + O[dt]^5 \Big) + \\ U^3\Big(-12\sqrt{3}\sqrt{gH(3+H^2k^2)} + 9U + H^4k^4U - 4k^2U - 4\sqrt{3}\sqrt{gH^5(3+H^2k^2)} + 6H^2U \Big) \Big) \Big) dt^4 + O[dt]^5 \Big) + \\ U^4\Big(-12\sqrt{3}\sqrt{gH(3+H^2k^2)} + 9U + H^4k^4U - 4k^2U - 4\sqrt{3}\sqrt{gH^5(3+H^2k^2)} + 6H^2U \Big) \Big) \Big) dt^4 + O[dt]^5 \Big) + \\ U^4\Big(-12\sqrt{3}\sqrt{gH(3+H^2k^2)} + 9U + H^4k^4U - 4k^2U - 4\sqrt{3}\sqrt{gH^5(3+H^2k^2)} + 6H^2U \Big) \Big) \Big) dt^4 + O[dt]^5 \Big) + \\ U^4\Big(-12\sqrt{3}\sqrt{gH(3+H^2k^2)} + 9U + H^4k^4U - 4k^2U - 4\sqrt{3}\sqrt{gH^5(3+H^2k^2)} + 6H^2U \Big) \Big) \Big) dt^4 + O[dt]^6 \Big) \Big] dt^4 + O[dt]^6 \Big) +$$

$$\begin{array}{l} -\frac{1}{4}ik^{3}\left(2\sqrt{g\,H}-\frac{\sqrt{3}\,U}{\sqrt{3}i\,H^{2}k^{2}}\right) + \frac{1}{4\left(1+H^{2}k^{2}\right)^{3/2}} + \frac{1}{4\left(1+H^{2}k^{2}\right)^{3/2}}$$

$$27 \left( 52 \sqrt{g^{5} H^{3}} \left( 3 + H^{2} k^{2} \right) - 172 \sqrt{3} g^{2} H^{2} U + 16 \sqrt{g H} \left( 3 + H^{2} k^{2} \right) U^{4} + 3 \sqrt{3} U^{3} + g H U^{2} \left( 210 \sqrt{g H} \left( 3 + H^{2} k^{2} \right) - 109 \sqrt{3} U \right) \right) - k^{6} U \left( 72 \sqrt{3} g^{2} H^{8} + 12 g H^{7} U \left( -3 \sqrt{g H} \left( 3 + H^{2} k^{2} \right) - 109 \sqrt{3} U \right) \right) - U^{3} \left( 16 \sqrt{g H^{13}} \left( 3 + H^{2} k^{2} \right) + 3 \sqrt{3} H^{6} U \right) \right) da^{3} + \frac{1}{99 \sqrt{g H} \left( 3 + H^{2} k^{2} \right)^{2}} \right)$$

$$k^{7} \left( 36 \sqrt{3} g^{3} H^{3} \left( 48 + 27 H^{2} k^{2} + 4 H^{4} k^{4} \right) + 3 \sqrt{3} g^{2} H^{2} \left( 4113 + 3075 H^{2} k^{2} + 712 H^{4} k^{4} + 48 H^{6} k^{6} \right) U^{2} + 2 g H U^{3} \left( -5076 \sqrt{g H} \left( 3 + H^{2} k^{2} \right) + 1971 \sqrt{3} U + 1872 \sqrt{3} H^{2} k^{2} U + 3 k^{4} \left( -216 \sqrt{g H^{9}} \left( 3 + H^{2} k^{2} \right) + 1971 \sqrt{3} U^{4} + 1872 \sqrt{3} H^{2} k^{2} U + 3 k^{4} \left( -16 \sqrt{g H^{9}} \left( 3 + H^{2} k^{2} \right) + 432 \sqrt{g H} \left( 3 + H^{2} k^{2} \right) U^{4} + 81 \sqrt{3} U^{5} \right) + k^{6} U \left( 16 \sqrt{g H^{13}} \left( 3 + H^{2} k^{2} \right) + 3 \sqrt{3} H^{6} U \right) \right) - U \left( 7344 \sqrt{g^{5}} H^{3} \left( 3 + H^{2} k^{2} \right) + 432 \sqrt{g H} \left( 3 + H^{2} k^{2} \right) U^{4} + 81 \sqrt{3} U^{5} + k^{6} U^{4} \left( 16 \sqrt{g H^{13}} \left( 3 + H^{2} k^{2} \right) + 3 \sqrt{3} H^{6} U \right) \right) - 4 k^{6} U \left( 16 \sqrt{g H^{13}} \left( 3 + H^{2} k^{2} \right) + 3 \sqrt{3} H^{6} U \right) \right) - 4 k^{6} \left( 48 \sqrt{g^{5}} H^{13} \left( 3 + H^{2} k^{2} \right) + 3 \sqrt{3} H^{6} U \right) \right) - 4 k^{6} \left( 48 \sqrt{g^{5}} H^{13} \left( 3 + H^{2} k^{2} \right) + 3 \sqrt{3} H^{6} U \right) \right) \right) \right) \left( 384 \left( 3 + H^{2} k^{2} \right) \right) + 4 \left( 48 \sqrt{g^{5}} H^{13} \left( 3 + H^{2} k^{2} \right) + 16 \sqrt{g H^{9}} \left( 3 + H^{2} k^{2} \right) U^{4} + 3 \sqrt{3} H^{4} U^{5} \right) \right) \right) dt^{4} + O[dt]^{5} \right) dx^{2} + k^{2} \left( 4 \sqrt{g H^{9}} \left( 3 + H^{2} k^{2} \right) + 3 \sqrt{3} H^{2} U^{2} \right) \right) \right) \left( 384 g H \left( 3 + H^{2} k^{2} \right)^{3/2} \right) \right) + k^{4} \left( 48 \sqrt{g^{6}} H^{13} \left( 3 + H^{2} k^{2} \right) - 7 \sqrt{3} H^{4} U \right) \right) \right) \right) \left( 384 g H \left( 3 + H^{2} k^{2} \right)^{3/2} \right) - 5 \left( 16 \sqrt{g H^{9}} \left( 3 + H^{2} k^{2} \right) - 3 \sqrt{3} H^{4} U + 224 \sqrt{g^{9}} H^{7} \left( 3 + H^{2} k^{2} \right) - 2 \sqrt{3} H^{2} U + 3 \sqrt{3} H^{2} U \right) \right) \right) \left( 384 g H^{1} \left( 3 + H^{2} k^{2} \right) - 3 \sqrt{3} H^{2} U^{2} \right) - 3 \sqrt{3} H^{2} U^{2} \right) + 2 \sqrt{g^{9$$

272  $\sqrt{3}$  g<sup>2</sup> H<sup>6</sup> U - 3  $\sqrt{3}$  H<sup>4</sup> U<sup>5</sup> + 2 g H<sup>5</sup> U<sup>2</sup> (56  $\sqrt{g$  H (3 + H<sup>2</sup> k<sup>2</sup>) - 17  $\sqrt{3}$  U))))  $dt^{3} - \tfrac{1}{384\,g\,H\,\left(3 + H^{2}\,k^{2}\right)^{9/2}}\emph{i}\,\,k^{8}\left(\sqrt{\,3\,}\,\,\sqrt{\,g\,H\left(3 + H^{2}\,k^{2}\right)}\, - \left(3 + H^{2}\,k^{2}\right)\,U\right)^{2}$  $\left(-3 \, k^2 \left(304 \, \sqrt{\,g^5 \, H^9 \left(3+H^2 \, k^2\right)} \right. \right. \\ \left.-884 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right. U^2 - \left.-484 \, k^2 \left(304 \, \sqrt{\,g^5 \, H^9 \left(3+H^2 \, k^2\right)} \right) \right] \\ \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{3} \, g^2 \, H^4 \, U + 456 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-284 \, \sqrt{\,g^3 \, H^7 \left(3+H^2 \, k^2\right)} \right] U^2 - \left.-28$  $95\,\sqrt{3}\,g\,H^3\,U^3 - 6\,\sqrt{g\,H^5\left(3 + H^2\,k^2\right)}\,\,U^4 - 6\,\sqrt{3}\,\,H^2\,U^5\right) 27 \left(80 \; \sqrt{\,g^5 \, H^5 \left(3 + H^2 \, k^2\right)} \; - 168 \; \sqrt{\,3\,} \; g^2 \, H^2 \, U - 2 \; \sqrt{\,g \, H \left(3 + H^2 \, k^2\right)} \; \, U^4 \, - \right.$  $\sqrt{3} \text{ U}^5 + \text{g H U}^2 \left(112 \sqrt{\text{g H} \left(3 + \text{H}^2 \text{k}^2\right)} - 17 \sqrt{3} \text{ U}\right)\right)$  $k^{4} \left(96 \; \sqrt{g^{5} \; H^{13} \left(3 + H^{2} \; k^{2}\right)} \; -400 \; \sqrt{3} \; \; g^{2} \; H^{6} \; U - 3 \; \sqrt{3} \; \; H^{4} \; U^{5} \; + \right.$  $4\,g\,H^5\,U^2 \left(36\,\sqrt{g\,H\left(3+H^2\,k^2\right)}\,-11\,\sqrt{3}\,U\right)\right)\right)dt^4+O[dt]^5\right)dx^3+$  $\left(\left(k^{5}\left(-16\sqrt{3}\ g^{2}\ H^{2}\left(144+48\ H^{2}\ k^{2}+5\ H^{4}\ k^{4}\right)+75\sqrt{3}\ \left(3+H^{2}\ k^{2}\right)^{2}\ U^{4}+8\ g\ H\left(3+H^{2}\ k^{2}\right)U^{2}\right)\right)^{2}\right)^{2}$  $\left(96\,\sqrt{g\,H\left(3+H^{2}\,k^{2}\right)}\,+k^{2}\!\left(32\,\sqrt{g\,H^{5}\left(3+H^{2}\,k^{2}\right)}\,-5\,\sqrt{3}\,H^{2}\,U\right)\right)\right)\right/$  $\left(30\,720\,(g\,H)^{3/2}\left(3+H^2\,k^2\right)^{5/2}\right)+\frac{1}{92\,160\,(g\,H)^{3/2}\,(3+H^2\,k^2)^{7/2}}$  $i\,k^{6} \left(9\,k^{2} \left(8448\,\sqrt{g^{5}\,H^{9} \left(3+H^{2}\,k^{2}\right)}\right.\right.\\ \left.-16\,160\,\sqrt{3}\,g^{2}\,H^{4}\,U+6144\,\sqrt{g^{3}\,H^{7} \left(3+H^{2}\,k^{2}\right)}\right.U^{2}+\left.\left(4448\,\sqrt{g^{3}\,H^{2} \left(3+H^{2}\,k^{2}\right)}\right)\right]U^{2}+\left.\left(4448\,\sqrt{g^{3}\,H^{2} \left(3+H^{2}\,k^{2}\right)}\right)\right]U^{2}+\left.\left(4448\,H^{2} \left(3+H^{2}\,k^{2}\right)\right)\right]U^{2}+\left.\left(4448\,H^{2} \left(3+H^{2}\,k^{2}\right)\right)\right]U^{2}+\left.\left(4444\,H^{2} \left(3+H^{2}\,k^{2}\right)\right)\right]U^{2}+\left.\left(4444\,H^{2} \left(3+H^{2}\,k^{2}\right)\right)$  $240\,\sqrt{3}\,g\,H^3\,U^3+675\,\sqrt{3}\,H^2\,U^5\Big)+k^6\Big(1920\,\sqrt{g^5\,H^{17}\,\big(3+H^2\,k^2\big)}\, 4368\sqrt{3}$  g<sup>2</sup> H<sup>8</sup> U + 2048 g H<sup>7</sup>  $\sqrt{g H (3 + H^2 k^2)}$  U<sup>2</sup> + 225  $\sqrt{3}$  H<sup>6</sup> U<sup>5</sup>) +  $3\;k^{4}\left(6720\;\sqrt{\,g^{5}\,H^{13}\left(3\,+\,H^{2}\,k^{2}\right)}\right.\\ \left.-\,14\,512\;\sqrt{\,3\,}\;g^{2}\,H^{6}\,U\,+\,675\;\sqrt{\,3\,}\;H^{4}\,U^{5}\,+\,4600\,H^{2}\,H$  $24 g H^5 U^2 \left(256 \sqrt{g H \left(3 + H^2 k^2\right)} + 5 \sqrt{3} U\right)\right) + 27 \left(3968 \sqrt{g^5 H^5 \left(3 + H^2 k^2\right)} - 4 \sqrt{g^5 H^5 \left(3 + H^2 k^2\right)}\right) + 2 \sqrt{g^5 H^5 \left(3 + H^2 k^2\right)} + 2 \sqrt{g^5 H^5 \left(3 + H^2 k^2\right)}\right) + 2 \sqrt{g^5 H^5 \left(3 + H^2 k^2\right)}$  $6016\,\sqrt{3}\,g^2\,H^2\,U + 225\,\sqrt{3}\,U^5 + 8\,g\,H\,U^2\left(256\,\sqrt{g\,H\left(3 + H^2\,k^2\right)}\, + 15\,\sqrt{3}\,U\right)\right)\right)dt - 4000\,g^2\,H^2\,U + 225\,\sqrt{3}\,U^2 + 225\,U^2 + 225\,U$  $\frac{1}{^{92\,160\,\left((g\,H)^{3/2}\,\left(3+H^2\,k^2\right)^{7/2}\right)}}\!\!\left(k^7\left(-48\,\sqrt{\,3\,}\,g^3\,H^3\left(6192+5004\,H^2\,k^2+1425\,H^4\,k^4+140\,H^6\,k^6\right)-\right.$  $8\,\sqrt{3}\,\,g^2\,H^2\left(60\,426+55\,557\,H^2\,k^2+17\,121\,H^4\,k^4+1772\,H^6\,k^6\right)U^2+$  $g H U^{3} \left(89856 \sqrt{g H (3 + H^{2} k^{2})} + 5265 \sqrt{3} U + 4590 \sqrt{3} H^{2} k^{2} U + 4500 \sqrt{3}$  $9 \, k^4 \left(3328 \, \sqrt{g \, H^9 \left(3 + H^2 \, k^2\right)} \right. \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right. \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{3} \, H^4 \, U\right) + 8 \, k^6 \left(416 \, \sqrt{g \, H^{13} \left(3 + H^2 \, k^2\right)} \right) \\ \left. + \, 145 \, \sqrt{g \, H^2 \, M^2 \, M^2} \right) \\ \left. + \, 145 \, \sqrt{g \, H^2 \, M^2 \, M^2} \right) \\ \left. + \, 145 \, \sqrt{g \, H^2 \, M^2 \, M^2} \right) \\ \left. + \, 145 \, \sqrt{g \, H^2 \, M^2 \, M^2} \right) \\ \left. + \, 145 \, \sqrt{g \, H^2 \, M^2 \, M^2} \right) \\ \left. + \, 145 \, \sqrt{g \, H^2 \, M^2 \, M^2} \right) \\ \left. + \, 145 \, \sqrt{g \, M^2 \, M^2 \, M^$  $15\,\sqrt{3}\,H^{6}\,U\bigg)\bigg) + 3\,U\bigg(81\bigg(2816\,\sqrt{g^{5}\,H^{5}\,\big(3 + H^{2}\,k^{2}\big)}\, + 25\,\sqrt{3}\,U^{5}\bigg) +$  $3\;k^{2}\left(52\,352\,\sqrt{\,g^{5}\,H^{9}\left(3\,+H^{2}\,k^{2}\right)}\right.\,+\,9984\;\sqrt{\,g^{3}\,H^{7}\left(3\,+H^{2}\,k^{2}\right)}\;\,U^{2}\,+\,675\;\sqrt{\,3}\;\,H^{2}\,U^{5}\right)+$  $3 \ k^4 \left(11 \ 776 \ \sqrt{g^5 \ H^{13} \left(3 + H^2 \ k^2\right)} \right. + 225 \ \sqrt{3} \ H^4 \ U^5 \right) +$  $5\,k^{6} \left(512\,\sqrt{g^{5}\,H^{17}\left(3+H^{2}\,k^{2}\right)}\right. \\ \left. +\,15\,\sqrt{3}\,\,H^{6}\,U^{5}\right)\right)\right) dt^{2} - \frac{1}{_{30\,720\,(g\,H)^{3/2}\,(3+H^{2}\,k^{2})^{9/2}}}$  $\mathit{i}\,\,k^{8} \left(27\,k^{2} \left(20\,416\,\sqrt{\,g^{7}\,H^{11} \left(3\,+\,H^{2}\,k^{2}\right)}\right.\right.\\ \left.-\,80\,544\,\sqrt{\,3}\,\,g^{3}\,H^{5}\,U\,+\,82\,240\,\sqrt{\,g^{5}\,H^{9} \left(3\,+\,H^{2}\,k^{2}\right)}\right.U^{2}\,-\,80\,544\,\sqrt{\,g^{5}\,H^{2} \left(20\,416\,\sqrt{\,g^{7}\,H^{11} \left(3\,+\,H^{2}\,k^{2}\right)}\right.}\right]$ 

$$\begin{split} & 46960\sqrt{3} \ g^2 \ H^4 \ U^3 + 6144\sqrt{g^3 \ H^7 \left(3 + H^2 \ k^2\right)} \ U^4 + 305\sqrt{3} \ g \ H^3 \ U^5 + 300\sqrt{3} \ H^2 \ U^7 \right) + \\ & k^8 \left(480\sqrt{g^7 \ H^{23} \left(3 + H^2 \ k^2\right)} - 11520\sqrt{3} \ g^3 \ H^{11} \ U + 5760\sqrt{g^5 \ H^{21} \left(3 + H^2 \ k^2\right)} \ U^2 - \\ & 9888\sqrt{3} \ g^2 \ H^{10} \ U^3 + 75\sqrt{3} \ H^8 \ U^7 + 16 \ g \ H^9 \ U^4 \left(96\sqrt{g \ H \left(3 + H^2 \ k^2\right)} + 5\sqrt{3} \ U \right) \right) + \\ & 243 \left(2592\sqrt{g^7 \ H^7 \left(3 + H^2 \ k^2\right)} - 8128\sqrt{3} \ g^3 \ H^3 \ U + 9152\sqrt{g^5 \ H^3 \left(3 + H^2 \ k^2\right)} \ U^2 - \\ & 4168\sqrt{3} \ g^2 \ H^2 \ U^3 + 25\sqrt{3} \ U^7 + g \ H \ U^4 \left(512\sqrt{g \ H \left(3 + H^2 \ k^2\right)} + 25\sqrt{3} \ U \right) \right) + \\ & 3k^6 \left(6720\sqrt{g^7 \ H^{19} \left(3 + H^2 \ k^2\right)} - 55216\sqrt{3} \ g^3 \ H^9 \ U + 39488\sqrt{g^5 \ H^{17} \left(3 + H^2 \ k^2\right)} \ U^2 - \\ & 41728\sqrt{3} \ g^2 \ H^8 \ U^3 + 300\sqrt{3} \ H^6 \ U^7 + 3 \ g \ H^7 \ U^4 \left(2048\sqrt{g \ H \left(3 + H^2 \ k^2\right)} + 105\sqrt{3} \ U \right) \right) + \\ & 9k^4 \left(19040\sqrt{g^7 \ H^{15} \left(3 + H^2 \ k^2\right)} - 99856\sqrt{3} \ g^3 \ H^7 \ U + 88512\sqrt{g^5 \ H^{13} \left(3 + H^2 \ k^2\right)} \ U^2 - 66296\sqrt{3} \ g^2 \ H^6 \ U^3 + 450\sqrt{3} \ H^4 \ U^7 + 3 \ g \ H^5 \ U^4 \left(3072\sqrt{g \ H \left(3 + H^2 \ k^2\right)} + 155\sqrt{3} \ U \right) \right) \right) d^3 + \\ & \frac{1}{92160 \ (g \ H^{15})^{3} \left(2 + H^2 \ k^2\right)} \left(-144\sqrt{3} \ g^4 \ H^4 \left(23832 + 22104 \ H^2 \ k^2 + 7395 \ H^4 \ k^4 + 10000\ H^6 \ k^6 + 408 \ H^8 \ k^8 \right) - \\ & 24\sqrt{3} \ g^3 \ H^3 \left(893700 + 953451 \ H^2 \ k^2 + 376029 \ H^4 \ k^4 + 64744 \ H^6 \ k^6 + 4080 \ H^8 \ k^8 \right) U^2 - \\ & 3\sqrt{3} \ g^2 \ H^2 \left(3 + H^2 \ k^2\right)^2 \left(197625 + 114352 \ H^2 \ k^2 + 16944 \ H^4 \ k^4 \right) U^4 + \\ & 2g \ H \ U^5 \left(238464\sqrt{g \ H} \left(3 + H^2 \ k^2\right) + 8505\sqrt{3} \ U + 13365\sqrt{3} \ H^2 \ k^2 \ U + \\ & 27k^4 \left(5888\sqrt{g \ H}^9 \left(3 + H^2 \ k^2\right) + 285\sqrt{3} \ H^4 \ U\right) + 3k^6 \left(11776\sqrt{g \ H^{13} \left(3 + H^2 \ k^2\right)} + 645$$

$$& \sqrt{3} \ H^6 \ U\right) + 4k^8 \left(736\sqrt{g \ H^{17} \left(3 + H^2 \ k^2\right)} + 45\sqrt{3} \ H^8 \ U\right) + \\ & 36k^2 \left(105472\sqrt{g^7 \ H^{11} \left(3 + H^2 \ k^2\right)} + 140096\sqrt{g^5 \ H^{13} \left(3 + H^2 \ k^2\right)} \ U^2 + 255\sqrt{3} \ H^4 \ U^7\right) + \\ & 12k^6 \left(9600\sqrt{g^7 \ H^{19} \left(3 + H^2 \ k^2\right)} + 20864\sqrt{g^5 \ H^{13} \left(3 + H^2 \ k^2\right)} \ U^2 + 75$$

Out[132]= Omega error ||

 $\left(\frac{h^2 U k^3+3 U k+\sqrt{1}}{16ft(\frac{h^2 U k+\sqrt{1}}{$  $\label{eq:continuity} $$ k^2+3\right)^2-\frac{h^2 k^2+3\right)^2}-\frac{h^2 k^2+3\right)^2}-\frac{h^2 k^2+3\right)^2}-\frac{h^2 k^2+3\right)^2}-\frac{h^2 k^2+3\right)^2}-\frac{h^2 k^2+3\right)^2}-\frac{h^2 k^2+3\left(\frac{h^2 k^2+3}{h^2 k^2+3}\right)^2}{h^2 k^2+3\left(\frac{h^2 k^2+3}{h^2 k^2+3}\right)^2}-\frac{h^2 k^2+3\left(\frac{h^2 k^2+3}{h^2 k^2+3}\right)^2}{h^2 k^2+3\left(\frac{h^2 k^2+3}{h^2 k^2+3}\right)^2}$  $\left(3 g H+U \left(\frac{H^2 k^2+3\right)} U+2 \right) H+U \left(\frac{H^2 k^2+3\right)}\right)$  $\label{left} $$ \left(\frac{dt}^2}{3 \left(\frac{H^2 k^2+3\right)^2}-\frac{k^4 \left(\frac{H^2 k^2+3\right) U+\sqrt{3} \sqrt{4} k^2}{16H(H^2 k^2+3\right)}} \right) U+\sqrt{3} \left(\frac{H^2 k^2+3\right)^2} \right) dt + \frac{1}{3} \left(\frac{H^2 k^2+3}{16H(H^2 k^2+3)}\right) dt + \frac{1}{3} \left(\frac{H^2$  $k^2+3\right) \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \right) \right) \right) \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \right) \right) \right) \right)$  $k^2+9 \left(U+\sqrt{3} \right) U^2+3 g \left(U+\sqrt{3} \right) U^2+3 U^2+3$ \cart(a H \laft(H^2 \laft) + 2\right)\ U\right)\rig

Squitg 11 Neut(11 4 K 473 argint); 11 argint/ argint/ weat(art 3); then (11 4 K 473 argint/ 3) that (k 11 argint/ argint/ 11 argint/ a  $k^2+3\right) U+\sqrt{3} \left(H^4 U k^4+2 \left(H^2 U k^2+3\right)\right) \left(H^4 U k^4+2 \left(H^4 U k^4+2 \left(H^4 U k^4+2\right)\right)\right)$  $H^2\left(\frac{dt}^4}{5 \left(\frac{1}{4} i k^2\right)} + \frac{dt}{4} i k^2 + \frac{dt}^4}{5 \left(\frac{1}{4} i k^2\right)} + \frac{dt}{4} i k^2 + \frac{dt}^4}{5 \left(\frac{1}{4} i k^2\right)} + \frac{dt}{4} i k^2 + \frac{dt}$  $\label{left(frac(sqrt{3} U)(sqrt{H^2 k^2+3})}+2 \operatorname{left(sqrt{3} U+2 sqrt{g H})right)}+ \\ \operatorname{left(sqrt{3} U+2 sqrt{g H left(H^2 Left(Sqrt{3} U+2 sqrt{g H})right)}+\\ \operatorname{left(sqrt{3} U+2 sqrt{g H})right(Sqrt{3} U+2 sqrt{g H})right(Sqrt{4} U+2 sqrt{g H})right$  $k^2+3\right) \left( H^2 k^2+3\right) + \left( H^2 k^2+3\right) + \left( H^2 k^2+3\right) \right) + \left( H^2 k^2+3\right) + \left( H^2 k^$  $\left(\frac{4}{g} \left(\frac{4}{g}\right)\right)^{3/2}+\frac{4}{g} U+2 \left(\frac{4}{g} \left(\frac{4}{g}\right)\right)^{3/2}$  $\label{left} $\left(\left(H^4 \cup k^4 + 3 \cdot \left(U + ^2 + \sqrt{3} \cdot H^5 \cdot H^5 \cdot k^2 + 3 \cdot H^5 \right)\right)\right) + \left(U + \right) $\left(U + \left(U + \right) \right) $\left(U + \left(U + \right) \right) $\left(U + \left(U + \right) \right) $\left(U + \left(U + \left(U + \right) \right) $\left(U + \left(U + \left(U$  $\label{eq:continuous} $\operatorname{H}\left(H^2 k^2+3\right)\right)\right) + \operatorname{H}\left(H^2 k^2+3\right) + \operatorname{H}\left(H^2 k^2 U H^3+9 U H^3+9 U H^3\right) + \operatorname{H}\left(H^2 u H^3+9 U H^3+9 U H^3\right) + \operatorname{H}\left(H^2 u H^3+9 U H$  $\label{left(H^2 k^2+3\right)} $$ k^2+3\right) H\right) + (h^2) + (h$  $U+2 \left( H^2 \left( H^2 + 1 \right) \right) \left( H^2 + 1 \right) \left( H^4 + 1 \right)$  $\left(H^2 k^2+3\right)\right)\right)$  $\label{left(4.2)} $\left( \frac{h^2 k^2+3\right) U+2 \sqrt{4} \left( \frac{h^2 k^2+3\right)} U+9 \right) U+9 \left( \frac{h^2 k^2+3\right) U+9 \left( \frac{h^2 k^2+3\right)$  $\t (text{dt}^4){4 \left( \frac{h^2 k^2+3\right)^{5/2}}+O\left( \frac{dt}{5} \right) } + O\left( \frac{dt}{5} \right) } + O\left$  $\left(12 \right) gH\left(12 \right) gH\left(14^2 \left(16\right) + U\left(16\right) gH\left(16\right) gH$  $H^2 U \rightarrow k^2-9 \qquad U+48 \qquad H^2 W^2+3 \rightarrow k^2+3 \rightarrow k$  $\left(\frac{H^2 k^2+3\right)}{-3}\left(\frac{H^2 k^2+3\right)}-\frac{k^4 \left(\frac{U^2 \left(\frac{H^2 k^2+3\right)}{-3}}{-3}\right)}{-3}$  $\sqrt{3} H^4 U \right) k^4+6 \left(-3 \right) H^2 U^3+16 \right) (H^2 k^2+3 \right) U^2+18$  $\sqrt{g^3 H^7 \left(\frac{H^2 k^2+3\right)}}\right) k^2+9 U^2 \left(\frac{16 \operatorname{sqrt}\{g H \left(\frac{H^2 k^2+3\right)}\right)}{3}\right)}$  $\sqrt{3} U\rightight)+4 g H \left[10 \right] V H^4+3 \left[4 H^9 \left[4 A^2 + A^2\right] \right] k^4+63$  $\sqrt{3} H^2 U k^2+99 \sqrt{3} U+63 \sqrt{g H \left(\frac{h^2 k^2+3\right)}\right)} \left(\frac{3}{4} H^2 U k^2+99 \right)$  $\label{left(H^2 k^2+3\pi ight)^{5/2}} + \frac{k^5 \left(\frac{16 \operatorname{sqrt}g H^9 \left(\frac{4^2 k^2+3\pi ight}{4^2 k^2+3\pi ight}\right)-3 \operatorname{sqrt}{3}}{k^2 + 3\pi ight}\right)}{3} + \frac{1}{2} \left(\frac{1}{2} + \frac{1}{2} \operatorname{sqrt}{3} + \frac{1}{2} \operatorname{sqrt$  $H^4 \ U + 6 \ k^4 + 16 \$  $H^7 \left(H^2 k^2+3\right) U\right) U\right) +9$  $U^3 \left(16 \right) + H \left(16 \right) + H$  $\$  \\sqrt{g H^9 \left(H^2 k^2+3\right)\\right) \\right\) \\right\) \\sqrt{3} H^2 U \\\right\) \\sqrt{3} U+864 \\sqrt{g H}  $\label{left(H^2 k^2+3\wedge ight)\wedge (h^2 k^2+3\wedge ight)\wedge$  $\label{eq:left} $\left(U \left( V_{72 \right) g^2 H^8+12 g U \left( s_{71} \right) U+3 \left( H^2 k^2+3 \right) \right)\right) right}$$  $H^7+U^3 \left(16 \right)^2 H^6(16 \right)^3 \left(16 \right)^3 \left(16$ \sqrt{3} g^2 U H^6+g U^2 \left(301 \sqrt{3} U+264 \sqrt{g H \left(H^2 k^2+3\right)}\right) H^5-9 \sqrt{3}  $\label{left} $$U^5 + ^4+48 \left( H^2 k^2+3\right) U^4+36 \left( H^2 k^2+3\right) \right] U^4+36 \left( H^2 k^2+3\right) \left( H^$ k^4+9 \left(-9 \sqrt{3} H^2 U^5+48 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^4+314 \sqrt{3} g H^3  $k^2+3\right) \$   $k^2+27 \left(-3 \right) k^2+16 \right) 16$  $\label{left(H^2 k^2+3\right)} $$\left(H^2 k^2+3\right)^{\frac{1}{2}}-\frac{dt}{3}{96 \cdot qrt{g H} \left(H^2 k^2+3\right)^{\frac{7}{2}}-\frac{dt}{k^7}}\right)$$$ \left(36 \sqrt{3} g^3 \left(4 H^4 k^4+27 H^2 k^2+48\right) H^3+3 \sqrt{3} g^2 \left(48 H^6 k^6+712  $H^4 k^4 + 3075 H^2 k^2 + 4113 \cdot y^2 H^2 + 2 g U^3 \cdot (13) \cdot y^4 + 2 t^2 H^6 + 12 \cdot y^4 H^6 + 12$ \left(H^2 k^2+3\right)\right) k^6+3 \left(197 \sqrt{3} U H^4+216 \sqrt{g H^9 \left(H^2 k^2+3\right)\right)}\right)  $k^4+1872 \sqrt{4} H^2 U k^2+1971 \sqrt{3} U+5076 \sqrt{4} H \left(H^2 k^2+3\right)\right)$  $\left(U^4 \left(16 \right) + H^{13} \left(H^2 k^2 + 3\right) - 3 \right) + H^6 U\right) k^6 + 9 \left(H^2 k^2 + 3\right) + 16 \left(H^2$ 

. . .

 $H^4 U^5+16 \sqrt{H^2 k^2+3\right} U^4+48 \sqrt{g^5 H^{13} \left(H^2 k^2+3\right)} U^3+48 \sqrt{g^5 H^{13} \left(H^2 k^2+3\right)}$  $k^4+9 \left( -9 \right) H^2 U^5+48 \left( H^5 \left( H^2 k^2+3 \right) U^4+760 \right) H^7 \left( H^2 k^2+3 \right) U^4+760 \right) H^7 \left( H^2 k^2+3 \right) H^7 \left( H^7 k$  $k^2+3\right) U^2+400 \sqrt{6^5 H^9 \left(H^2 k^2+3\right)} V^2+400 \sqrt{6^5 H^9 \left(H^2 k^2+3\right)} V^2+3V^2+400 \sqrt{6^5 H^9 \left(H^2 k^2+3\right)} V^2+400 \sqrt{6^5 H^9$  $\left(H^2 k^2+3\right) U^4+7344 \right(1)^2 H^5 \left(H^2 k^2+3\right)\right)\right) \left(H^2 k^2+3\right) \left(H^$  $k^4 \left(\frac{3}{g} \left(\frac{4}{g} \right) \right) H^2+4 \left(\frac{4}{g} H^2\right)$  $k^2+3\right) \left( h^2 + h^2 + h^2 \right) \left( h^2 + h^2 \right$  $\label{left} $$k^2+3\right)^{3/2}_-\frac{(16)^{1/2} k^2+3\right)^2 U^4+2 g H \left(\frac{1}{2} k^2+3\right)^2 U^4+2 U^4+2 U^4+2 U^4+2 U^4+2 U^4+2 U^4+2$ \sqrt{3} U H^4+24 \sqrt{g H^9 \left(H^2 k^2+3\right)\right) k^4+24 \left(2 \sqrt{3} U H^2+7 \sqrt{g H^5}  $\left(H^2 k^2+3\right) \$ U+8 \sqrt{3} g^2 H^2 \left(5 H^4 k^4+33 H^2 k^2+54\right)\right)\right) \text{dt}}{384 \left(g H  $\left(H^2 k^2+3\right)^{5/2}\right)-\frac{i}{6}$  $\sqrt{3} U+10 \sqrt{g} H \left(\frac{^2 k^2+3\right)} H^5+3 \sqrt{3} U^5 H^4+16 \sqrt{g^5 H^{13}}$ \left(H^2 k^2+3\right)\right) k^4+3 \left(6\sqrt{3} H^2 U^5+51 \sqrt{3} g H^3 U^3+224 \sqrt{g^3 H^7  $\left(H^2 k^2+3\right) U^2+380 \right] H^4 U+96 \left(H^2 k^2+3\right) U^2+380 \right]$  $k^2+9 \left(3 \right) U^5+g H\left(27 \right) U+160 \left(4^2 k^2+3\right)\right)$ U^2+224 \sqrt{3} g^2 H^2 U+96 \sqrt{g^5 H^5 \left(H^2 k^2+3\right)\right)\right)\right)\\ text{dt}^2}{384 g k^2+3\right)\right)\left(\left(272 \sqrt{3} g^2 U H^6+2 g U^2 \left(17 \sqrt{3} U+56 \sqrt{g H \left(H^2 k^4+3 \left(6 \sqrt{3} H^2 U^5-3 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^4+72 \sqrt{3} g H^3 U^3+334  $\sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^2+608 \right] g^2 H^4 U+184 \right] h^9 \left(H^2 L^2 + 184 \right)$  $k^2+3\right) \ h^2+9 \left( 3 \right) \ h^2-3 \right) \ h^2+3 \$  $H^5 \left(H^2 k^2+3\right)\right)\right) \left(H^2 k^2+3\right) \left(H^2$  $\left(\left(\frac{H^2 k^2+3\right)}{U+\sqrt{3} \sqrt{400}}\right) + \left(\frac{H^2 k^2+3\right)}{U+\sqrt{3} \sqrt{3} \sqrt{3}}$  $g^2 U H^6+4 g U^2 \left(11 \right) + 1 \left(14 + 2 \right) +$  $H^4+96 \sqrt{g^5 H^{13} \left( \frac{4^2 + \sin(h^2 k^2 + 3\right)}{h^4 + 96 \right)}} h^4+3 \left( \frac{3}{4^2 U^5 - 6 \right)} h^5$  $\left(H^2 k^2+3\right) U^4+95 \right] U^4+95$  $\$  \quad \  $H \left( H^2 k^2 + 3 \right) U^4 + g H \left( 17 \right) U^1 + g H$ U^2+168 \sqrt{3} g^2 H^2 U+80 \sqrt{g^5 H^5 \left(H^2 k^2+3\right)\right)\right)\right)\\text{dt}^4}{384 g H  $\left(H^2 k^2+3\right) + \left(H^2 k^2+3\right) + \left(H^2 k^3+H^2\right)$  $\left(H^2 k^2+3\right)^2 U^4+8 g H\left(H^2 k^2+3\right)\right) \left(H^5 \left(H^5 \right)^2 U^4+8 g H\right)$  $\left(H^2 k^2+3\right)\right) \ h^2+96 \ gH\left(H^2 k^2+3\right) \ U+16 \ g^2 H^2$  $\left(5 H^4 k^4+48 H^2 k^2+144\right)\right)\left(5 H^3 k^4+48 H^2 k^2+144\right)$ k^6 \left(\left(4368 \sqrt{3} g^2 U H^8+2048 g \sqrt{g H \left(H^2 k^2+3\right)} U^2 H^7-225 \sqrt{3}  $U^5 H^6+1920 \sqrt{g^5 H^{17} \left(\frac{H^2 k^2+3\right)}{tght}} k^6+3 \left(\frac{14512 \sqrt{3} g^2 U}{t^6+1920}\right)$  $H^6+24 g U^2 \left( 156 \right) + 16 (156 + 16) + 16$  $H^4+6720 \operatorname{sqrt}_{g^5} H^{13} \left( h^2 k^2+3\right) h^4+9 \left( -675 \operatorname{sqrt}_{3} H^2 U^5-240 \right)$ \sqrt{3} g H^3 U^3+6144 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^2+16160 \sqrt{3} g^2 H^4 U+8448  $\label{left(H^2 k^2+3\wedge ight)} -15 \cdot qrt\{3\} \ U \cdot ight) \ U^2 + 6016 \cdot qrt\{3\} \ g^2 \ H^2 \ U + 3968 \cdot qrt\{g^5 \ H^5 \cdot left(H^2 \ H^2 \ H^2 \ U + 3968 \cdot qrt\{g^5 \ H^2 \ H^2$ 

 $k^2+3\right)\right) \left( g H\right)^{3/2} \left( h^2 k^2+3\right)^{7/2}-\frac{h^2}{2} \left( h^2 k^2+3\right)^{7/2} \right)$ \left(48 \sqrt{3} g^3 \left(140 H^6 k^6+1425 H^4 k^4+5004 H^2 k^2+6192\right) H^3+8 \sqrt{3} g^2 \left(1772 H^6 k^6+17121 H^4 k^4+55557 H^2 k^2+60426\right) U^2 H^2+g U^3 \left(8 \left(416  $\$  \\ \quad \P^{13} \\ \eft(\P^2 \ k^2 + 3\right)\ -15 \\ \quad \P^3 \ \ \eft(\P^2 \ k^6 + 9 \\ \eft(\P^3 \ \quad \P^6 \ \P^7 \\ \eft(\P^2 \ \eft(\P k^2+3\right)}-145 \sqrt{3} H^4 U\right) k^4-4590 \sqrt{3} H^2 U k^2-5265 \sqrt{3} U+89856 \sqrt{g}  $\sqrt{3} H^6 U^5 (13) k^6+3 \left(11776 \right) + (13) \left(H^2 k^2+3\right) -225 \left(13\right)$  $H^4 U^5 \right\} k^4+3 \left( -675 \right) H^2 U^5+9984 \right] h^7 \left( h^2 k^2+3 \right)$  $U^2+52352 \sqrt{g^5 H^9 \left(H^2 k^2+3\right)} k^2+81 \left(816 \sqrt{g^5 H^5 \left(H^2 k^2+3\right)} k^2+81 \right)$  $k^2+3\right)^{7/2}\right)-\frac{i^2 k^2 + 3^2 u^{3} g^3 u^{7/2}\right)^{7/2}\right)^{7/2}\left(i^8 \left(11520 \right)^{7/2}\right)^{7/2}\right)^{7/2}\left(i^8 \left(11520 \right)^{7/2}\right)^{7/2}\left(i^8 \left(11520 \right)^{7/2}\right)^{7/2}\right)^{7/2}$  $H^{10}+16 g U^4 \left( \frac{4 \cdot g U^4 \cdot g H \left( \frac{4^2 k^2+3 \right)}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{3}} U \right) + 16 g U^4 \left( \frac{6 \cdot g t{3}}{5 \cdot g t{$  $U^7 H^8 + 5760 \sqrt{g^5 H^{21} \left(H^2 k^2 + 3\right)} U^2 + 480 \sqrt{g^7 H^{23} \left(H^2 k^2 + 3\right)}$ k^2+3\right)\right) k^8+3 \left(55216 \sqrt{3} g^3 U H^9+41728 \sqrt{3} g^2 U^3 H^8+3 g U^4  $\left(2048 \right) + 16f(2048 \right) + 16f(4^2 k^2+3\right) - 105 \left(2048 \right) + 16f(2048 + 16f(204$  $\sqrt{g^5 H^{17} \left( \frac{4^2 k^2+3\right)} U^2+6720 \sqrt{g^7 H^{19} \left( \frac{4^2 k^2+3\right)} \right) k^6+9}$ \left(99856 \sqrt{3} g^3 U H^7+66296 \sqrt{3} g^2 U^3 H^6+3 g U^4 \left(3072 \sqrt{g H \left(H^2  $k^2+3\right)-155 \left(13\right) U\right)-155 \left(13\right) U\right)$  $k^2+3\right) U^2+19040 \sqrt{15} \left(H^2 k^2+3\right) right) right) k^4+27 \left(-300 \right) right) to 15 right) to 15$ H^2 U^7-305 \sqrt{3} g H^3 U^5+6144 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^4+46960 \sqrt{3} g^2  $H^4 U^3 + 82240 \sqrt{f^5 H^9 \left(H^2 k^2 + 3\right)} U^2 + 80544 \sqrt{3} g^3 H^5 U + 20416 \sqrt{g^7}$  $H^{11} \left( \frac{4^2 k^2 + 3\right)}{k^2 + 3\right) k^2 + 243 \left( \frac{-25 \sqrt{3} U^7 + g H \left( \frac{512 \sqrt{4} H^2 U^7 + g H^2$  $k^2+3\right)^2-25 \sqrt{3} U\right)^3-25 \sqrt{3} U\right)$ k^2+3\right)} U^2+8128 \sqrt{3} g^3 H^3 U+2592 \sqrt{g^7 H^7 \left(H^2 k^2+3\right)\right)\right)\right)  $\text{dt}^3{30720 (g H)^{3/2} \left( H^2 k^2+3\right)} + \frac{k^9}{9/2} + \frac{g H \left( 4 \left( H^2 k^2 + 3 \right) + \frac{k^9}{9/2} \right)}{16}$  $H^{17} \left( H^2 k^2 + 3\right) - 45 \right) + 45 \left( H^2 k^2 + 3\right) + 45 \left( H^$  $k^2+3\right)-645 \sqrt{4} k^2+3\right)-645 \sqrt{4} k^2+3\left(5888 \sqrt{4} H^9 \left(14^2 k^2+3\right)\right)-285$ \sqrt{3} H^4 U\right) k^4-13365 \sqrt{3} H^2 U k^2-8505 \sqrt{3} U+238464 \sqrt{g H \left(H^2 k^2+3\right)\right) U^5+3 \sqrt{3} g^2 H^2 \left(H^2 k^2+3\right)^2 \left(16944 H^4 k^4+114352) H^2 k^2+197625\right) U^4+24 \sqrt{3} g^3 H^3 \left(4080 H^8 k^8+64744 H^6 k^6+376029 H^4 k^4+953451 H^2 k^2+893700\right) U^2+3 \left(5 \left(-15 \sqrt{3} U^7 H^8+2048 \sqrt{g^5 H^{21}}  $\left(H^2 k^2+3\right) U^2+384 \right(H^2 k^2+3\right) \$ k^2+3\right)\right) k^6+18 \left(-225 \sqrt{3} H^4 U^7+100096 \sqrt{g^5 H^{13} \left(H^2 k^2+3\right)}  $U^2+60608 \left( \frac{g^7 H^{15} \left( H^2 k^2+3\right)}{h^2 U^7+5888} \right)$  $\label{eq:continuous} $\operatorname{g^3 H^7 \left(H^2 k^2+3\right)} U^4+144512 \left(g^5 H^9 \left(H^2 k^2+3\right)\right) U^2+105472 \right) $$  $H^5 \left(H^2 k^2+3\right) U^2+33920 \left(H^2 k^2+3\right) U^2+33920 \right)$ \sqrt{3} g^4 H^4 \left(40 H^8 k^8+1000 H^6 k^6+7395 H^4 k^4+22104 H^2 k^2+23832\right)\right)  $\label{eq:left} $$ \operatorname{dt}^4{92160 (g H)^{3/2} \left(H^2 k^2+3\right)^{9/2}}+O\left(\operatorname{dt}^5\right)\right)$$  $\t (4x)^4 + O\left( \frac{dx}^5 \right), \left( \frac{H^2 U k^3 + 3 U k - \sqrt{4x}^3} \right) + \left( \frac{dx}^5 \right) \right).$  $k^2+3\right) k^2 + k^2 + 3\left(k^3 \left(k^3 \left(k^3 \left(k^4 + k^2 + k^2$  $U-\sqrt{3} \operatorname{H}\left(H^2 k^2+3\right) - \left(H^2 k^2+3\right) -$ 

 $k^4 \left( \frac{h^2 k^2+3\right) U-\sqrt{h^2 k^2+3\right)} \left( \frac{h^2 k^2+3\right)}{h^2 k^2+3\right) }$  $k^4-3 \left( \frac{3} \right) \left( \frac{4^2 + 3^2 + 3^2 + 4^2 +$  $\left(H^2 k^2+3\right) U-3 g H \left(H^2 k^2+3\right) U-3 g$  $k^2+3\right) \right) + \frac{k^2+3\right)^3}{4\left(\frac{k^2+3\right)^3}+\frac{k^5\left(\frac{k^5}{k^5}\right)^3}{k^5}\right)^3} + \frac{k^5}{k^5} \left(\frac{k^5}{k^5}\right)^3 + \frac{k^5}{k^5} \left$  $U-\sqrt{g} H \left( \frac{A^2 k^2+3\right)} \right) \left( \frac{A^2 k^2+3\right)} \right) \left( \frac{A^2 k^2+3\right)} \right) \left( \frac{A^2 k^2+3\right)} \left( \frac{A^2 k^2+3\right)} \right) \left( \frac{A^2 k^2+3\right)} \left( \frac{A^2 k^2+3\right)} \left( \frac{A^2 k^2+3\right)} \right) \left( \frac{A^2 k^2+3\right)} {\left( \frac{A^2 k^2+3\right)} {\left( \frac{A^2 k^2+3\right)} \left( \frac{A^2 k^2+3\right)} {\left( \frac{$  $\$  \left(H^2 k^2+3\right)\right) k^2+9 U-12 \sqrt{3} \sqrt{g H \left(H^2 k^2+3\right)\right)}\right)  $U^3+6$  g H \left( $H^2$  k $^2+3$ \right) U-2 \sqrt{3} \sqrt{g H \left( $H^2$  k $^2+3$ \right)\right) U+9 g $^2$  $H^2\right) \text{ $t$ (t)^4}{5 \left( H^2 k^2 + 3\right)^3} + O\left( t \left( t \left( t \right)^5 \right) + \left( t \left( t \right)^6 \right) \right) + O\left( t \left( t \right)^6 \right)$  $i k^2 \left( \frac{g H}{\sin(2 \cdot grt{g H})-\frac{3 U}{\sin(4 \cdot grt{H^2 k^2+3})}\right) + \frac{k^3 \left( \frac{g H}{\sin(4 \cdot grt{g H})} \right)}{\sin(4 \cdot grt{g H})}$  $\left(H^2 k^2+3\right)-\sqrt{3} U\right) - \left(H^2 k^2+3\right) U-\sqrt{3} \sqrt{4} H \left(H^2 k^2+3\right) U-\sqrt{3}$  $k^2+3\right)-\sqrt{3} U\right) + \frac{1}{3} U\left(\frac{1}{3} U\right) + \frac{1}{3} U\left(\frac{$  $\label{left(H^2 k^2+3\right)\right)\right)\ \text{dt}^2} {4 \left(H^2 k^2+3\right)^{3/2}}-\frac{\left(h^5 k^5+3\right)^{3/2}} - \frac{\left(h^5 k^5+3\right)^$  $\left(\frac{1}{2} \right) \left(\frac{1}{2} \right) \left(\frac$  $\sqrt{g H^5 \left(H^2 k^2+3\right)}-2 H^2 U\right) k^2+9 U-9 \sqrt{3} \sqrt{g H \left(H^2 k^2+3\right)}-2 H^2 U\right)$  $k^2+3\right) \ U-\$  $\label{left(H^2 k^2+3\right)} $$ k^2+3\right) \right) $$ k^2+3\right) \left( k^2+3\right)^{5/2}-\frac{k^6 \left( k^6 \right)^2}{2 \left( k^6 \right)^2} \right) $$$  $H \left(H^2 k^2+3\right)-\sqrt{3} \left(H^4 U k^4+\left(H^4 U$  $\label{eq:localization} $\left(H^2 k^2+3\right)\right] \ h^2+9 U-12 \ \sqrt{3} \ \left(H^2 k^2+3\right) \ h^2+3 \ h^2+3$  $\left(\frac{h^2 k^2+3\right)}{U-2 \sqrt{h^2 k^2+3}}\right) U-2 \sqrt{h^2 k^2+3}\right)$  $\left(H^2 k^2+3\right)^{3/2}-\frac{i k^4 \left(H^2 \left(H^2 \right) + H^4+16\right)^{3/2}}{H^9 \left(H^2 \left(H^2 \right) + H^4+16\right)^{3/2}}$ k^2+3\right)\right) k^4+6 \left(3 \sqrt{3} H^2 U^3+16 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+18  $k^2+3\right)$  H \left(\left(3 \sqrt{g H^9 \left(H^2 k^2+3\right)}-10 \sqrt{3} H^4 U\right)  $k^4-63 \sqrt{3} H^2 U k^2-99 \sqrt{3} U+63 \sqrt{6} H \left( h^2 k^2+3\right) \right) \$  $\label{left(H^2 k^2+3\right)^{5/2}} + \frac{k^5 \left(U^3 \left(U^3 \right) + \frac{16}{3} U H^4 + 16 \right)^{5/2}} + \frac{16}{3} U H^5 + \frac$  $\left(H^2 k^2+3\right)\right)$ U^3+56 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U\right) k^2-12 \sqrt{3} g^2 H^2 \left(2 H^4 k^4+15)  $\left(4 \left(6 \right) k^4 - 429 \left(H^2 k^2 + 3\right) - 17 \right) h^4 U\right) k^4 - 429 \left(H^2 k^2 + 3\right) h^4 U\right)$  $U k^2 - 675 \sqrt{3} U + 864 \sqrt{g} H \left( h^2 k^2 + 3\right) \right) \left( h^2 k^2 + 3\right) \left($  $\left(H^2 k^2+3\right)^{5/2}+\frac{k^6}{10^2} - \left(H^2 k^2+3\right)^{5/2} + \frac{k^6}{10^2} - \left(H^2 k^2+3\right)^{5/2} + \frac{k^6}{10^2} - \frac{k^6}{10^2} -$ \sqrt{g H \left(H^2 k^2+3\right)\right) H^7-U^3 \left(3 \sqrt{3} U H^6+16 \sqrt{g H^{13} \left(H^2  $\label{eq:continuous} $$ k^2+3\right)\right\ k^6+3 \left(-304 \right) ^3 g^2 U H^6+g U^2 \left(264 \right) H^6+g U^2 \left(264 \right) $$$  $k^2+3\right)=301 \left( H^2 k^2+3\right) + 31 \left( H^5+9 \right) + 448 \left( H^9 \left( H^2 k^2+3\right) \right)$  $U^4+36 \sqrt{13} \left( \frac{4^2 k^2+3\right)}{right} k^4+9 \left( 9 \sqrt{13} H^2 U^5+48 \right)$  $H^5 \left(H^2 k^2+3\right) U^4-314 \right) U^3+438 \left(H^2 k^2+3\right) U^4-314$  $\label{eq:u^2-404 sqrt{3} g^2 H^4 U+84 sqrt{g^5 H^9 \left(\frac{h^2 k^2+3\right)} k^2+27 \left(\frac{3 \left(3 \right) h^2 U^2-404 \right)} h^2 U^2-404 \left(\frac{h^2 k^2+3 \right)} h^2 U^2-404 \left(\frac{h^2 k^2+3 u^2}{h^2 u^2}\right) h^2 U^2-404 \left(\frac{h^2$  $U^5+16 + H \left(H^2 k^2+3\right) + U^4+g + \left(10 + H^2 k^2+3\right) + 109$ 

 $\sqrt{3} U\right) U^2-172 \left(3 g^2 H^2 U+52 \right) H^5 \left(H^2 k^2+3\right)/\eta(1)\right)$  $\text{dt}^3$ {96 \sqrt{g H} \left(H^2 k^2+3\right)^{7/2}}+\\frac{k^7 \left(36 \sqrt{3} g^3 \left(4 H^4 k^4+27 H)^2}+\\frac{k^7 \left(36 \sqrt{3} g^3 \left(4 H^4 k^4+27 H)^2}+\\frac{k^7 \left(36 \sqrt{3} g^3 \left(4 H^4 k^4+27 H)^4}+\\frac{k^7 \left(4 H^4 k^4+2 H)^4}+\\frac{k^7 \l H^2 k^2+48\right) H^3+3 \sqrt{3} g^2 \left(48 H^6 k^6+712 H^4 k^4+3075 H^2 k^2+4113\right)  $\label{eq:u-2} $$U^2 H^2+2 g U^3 \left(2 \left(31 \right) H^6 U-12 \right) \left(H^2 k^2+3\right)\right)\right) + U^2 H^2+2 g U^3 \left(13 \right) \left(13 \right) H^6 U-12 \right) + U^2 H^2+2 g U^3 \left(13 \right) H^6 U-12 \left$  $k^6+3 \left(197 \right) + 4 U-216 \left(14^2 k^2+3\right) + k^4+1872 \left(14^2 k^2+3\right) + k^4+182 \left(14^2 k^2+3\right) + k^4 \left(14^2 k^2+3\right) + k^2 \left(14^2 k^2+3\right) + k^2 \left(14^2 k^2+3\right) + k^2 \left(14^2 k^2+3\right) + k^2 \left(14^2 k^2+3\right) +$  $H^2 U k^2+1971 \sqrt{1} \sqrt{1} U-5076 \sqrt{g H \left(H^2 k^2+3\right)} H-U \left(H^4 \left(H^2 k^2+3\right)\right)$  $\$  \\sqrt{g H^9 \left(H^2 k^2+3\right)} U^4+48 \\sqrt{g^5 H^{13} \left(H^2 k^2+3\right)}\\right) k^4+9  $k^2+3\right) U^2+400 \left( h^9 \left( h^2 k^2+3\right) k^2+81 \right) U^5+432 \left( h^2 k^2+3\right) h^2 U^5+442 \left( h^2 k^2+3\right) h$  $H \left( \frac{H^2 k^2 + 3 \right) \left( \frac{4}{3} + \frac{4}{96} + \frac{h^5 \left( \frac{H^2 k^2 + 3 \right)}{16} \right) \left( \frac{4}{3} + \frac{4}{96} + \frac{h^5 \left( \frac{H^2 k^2 + 3 \right)}{16} \right) \left( \frac{H^2 k^2 + \frac{1}{3} \right) \left( \frac{H^$  $\label{eq:linear_sqrt} $$ \left( H^2 k^2 + 3\right)^{7/2} + O\left( \left( \left( text{dt} \right)^5\right) \right) \left( text{dx} \right)^2 + \left( - \left( text{dx} \right)^2 + text{dx} \right)^2 + text{dx} \right)^2 + text{dx} \right) $$$  $\left(3 \right) \left(4 \right)$  $k^2+3\left( k^2+3\right) + k^2+6\left( k^2+3\right) + k^2+3\left( k$  $\label{left} $$ \eft(3 \right)^{3/2}+\frac{k^5 \left(1 - k^5 \right)^{2} \left(1 - k^5 \right)^{2} U^4-2 g H \left(1 - k^5 \right)^{2} U^4-2 U^4-2 g H \left(1 - k^5 \right)^{2} U^4-2 U^4-2 U^4-2 U^4-2 U^4-2 U^4-2 U^4-2 U^4-2 U$  $H^9 \left(H^2 k^2+3\right) - 7 \left(H^4 U\right) k^4+24 \left(H^7 \left(H^2 k^2+3\right) - 1\right) - 2$  $\sqrt{3} H^2 U \right) k^2-81 \sqrt{3} U+324 \sqrt{g H \left(\frac{h^2 k^2+3\right)}\right) U+8 \sqrt{3} g^2$  $H^2 \left( \frac{5 H^4 k^4+33 H^2 k^2+54\right)}{384 g H \left( \frac{4 k^2+3\right)}{52}} - \frac{1}{52}$  $U = \frac{1}{h^5-3 \sqrt{3} U^5 H^4+16 \sqrt{g^5 H^{13} \left(\frac{h^2 k^2+3\right)} k^4+3 \left(\frac{-6}{h^5-3} \right)} \ln(h^2 k^4+3 \ln(h^2 k^2+3) \ln(h^2 k^2+3)} \ln(h^2 k^4+3 \ln(h^2 k^2+3))} \ln(h^2 k^4+3 \ln(h^2 k^2+3))}$  $\sqrt{3} H^2 U^5-51 \sqrt{3} g H^3 U^3+224 \sqrt{g^3 H^7 \left(\frac{4^2 k^2+3\right)} U^2-380 \sqrt{3}}$ g^2 H^4 U+96 \sqrt{g^5 H^9 \left(H^2 k^2+3\right)}\right) k^2+9 \left(-3 \sqrt{3} U^5+g H \left(160  $\left(H^2 k^2+3\right)^2-27 \left(H^2 u^2+3\right)^2-27 \left(H^2 u^2+3\right)^2 U\right)^2-224 \left(H^2 u^2+3\right)^2$  $\left(H^2 k^2+3\right)\right) \left(H^2 k^2+3\right) \left(H^2 k^2+3\right$  $\label{left} $\left(\left(\frac{H^2 k^2+3\right) U-\sqrt{3} \right) H(H^2 k^2+3\right)}\right) \left(-\left(\frac{-272 \sqrt{3}}{2}\right) H(H^2 k^2+3\right) \left(\frac{H^2 k^2+3\right) H(H^2 k^2+3\right) H(H^2 k^2+3\right) H(H^2 k^2+3) H(H^2 k^2+3\right) H(H^2 k^2+3\right) H(H^2 k^2+3) H(H^2 k^2+3\right) H(H^2 k^2+3) H(H^2 k^2+3) H(H^2 k^2+3\right) H(H^2 k^2+3) H($  $g^2 U H^6+2 g U^2 \left( \frac{56 \sqrt{4 + 2 + 3 \right)}{17 \sqrt{3} U right} H^5-3 \sqrt{3} U^5 \right)$  $H^4+48 \left( \frac{6 \operatorname{13} \left( H^2 k^2+3\right)}{right} \right) \right)$  $\left(H^2 k^2+3\right) U^4-72 \right] U^4-72 \right] U^3+334 \right]$  $\sqrt{3} g^2 H^4 U+184 \sqrt{g^5 H^9 \left(H^2 k^2+3\right)} k^2-9 \left(-3 \sqrt{3} U^5-3 \right)$  $\left(H^2 k^2+3\right) U^4+2 g H \left(H^2 k^2+3\right)-19 \left(H^2 k^2+3\right) U \rightarrow U^2-352 \left( \frac{9^2 H^2 U+160 \left( \frac{9^5 H^5 \left( \frac{4^2 L^2 + 3 \right)}{10^2 U+160 \left( \frac{9}{10^2 U+160 \left( \frac{9}{10^$  $\label{eq:left} $$ \operatorname{dt}^3}_{384} \left( H^2 k^2 + 3\right)^{7/2}\right) - \frac{k^8 \left( \sqrt{3} \right)^{4}}{h^2} .$  $\left( H^2 k^2+3\right) -11 \right) H^5-3 \left( H^5-3 \right) U^5 H^4+96 \right)$  $\left(H^2 k^2+3\right) \ k^4-3 \left(H^2 u^5-6 \right) \ H^5 \left(H^2 k^2+3\right)$ U^4-95 \sqrt{3} g H^3 U^3+456 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^2-884 \sqrt{3} g^2 H^4  $U+304 \sqrt{g^5 H^9 \left(\frac{h^2 k^2+3\right)}{k^2-27 \left(\frac{-\sqrt{3} U^5-2 \sqrt{h^2 H^6}}{h^2 L^6}\right)}$  $k^2+3\right) U^4+g H \left(112 \right) U^2-168 U^2-13 U^3-13 U^$ \sqrt{3} g^2 H^2 U+80 \sqrt{g^5 H^5 \left(H^2 k^2+3\right)\right)\right) \text{dt}^4}{384 g H \left(H^2 k^2+3\right)}  $\label{left(4} $$ k^2+3\right)^{9/2}}+O\left(\frac{dt}^5\right)\right) \cdot \left(\frac{dx}^3+\left(\frac{dx}^3+\left(\frac{dx}^3\right)^3+$  $k^2+3\right)^2 U^4+8 g H \left(H^2 k^2+3\right) \left(16H(42 k^2+3\right)^2 U^4+8 g H^5 \left(H^2 k^2+3\right)^3 U^4+8 g H^5 \left(H^2 k^2+3\right)^3 U^4+8 g H^5 U^4$  $\sqrt{3} H^2 U \right) k^2+96 \right] H \left( h^2 k^2+3 \right) U-16 \right] g^2 H^2 \left( h^2 k^2+3 \right) U-16 \right]$  $H^4 k^4+48 H^2 k^2+144 \right) (g H)^{3/2} \left( H^2 k^2+3 \right)^{5/2} + \frac{1}{4} \left( H^2 k^2+3 \right) (g H)^{3/2} \left( H^2 k^2+3 \right$ \laft/\laft/\_A268 \sart(3) a^2 II U^8\_20149 a \sart(a U \laft(U^2 b^2\_2)right)) II^2 U^7\_225 \sart(3)

WELLING CET 11 11 TEACH OF SHIPTING INDICET. WITH THE WILL A PERMITTION OF STREET U^5 H^6+1920 \sqrt{g^5 H^{17} \left(H^2 k^2+3\right)}\right) k^6+3 \left(-14512 \sqrt{3} g^2 U  $H^6+24 g U^2 \left( \int \sqrt{1} U+256 \right) H^6+24 g U^2 \left( \int \sqrt{1} U+25$ H^4+6720 \sqrt{g^5 H^{13} \left(H^2 k^2+3\right)\right) k^4+9 \left(675 \sqrt{3} H^2 U^5+240 \sqrt{3} g H^3 U^3+6144 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^2-16160 \sqrt{3} g^2 H^4 U+8448 \sqrt{g^5 H^9 \left(H^2 k^2+3\right)\right) k^2+27 \left(225 \sqrt{3} U^5+8 g H \left(15 \sqrt{3} U+256  $\sqrt{g} H \left( \frac{4^2 k^2+3 \right)} \right) U^2-6016 \right) g^2 H^2 U+3968 \right]$  $k^2+3\right)\right) \left( g H\right)^{3/2} \left( h^2 k^2+3\right)^{7/2}-\frac{h^2}{2} \left( h^2 k^2+3\right)^{7/2} \right)$ \left(-48 \sqrt{3} g^3 \left(140 H^6 k^6+1425 H^4 k^4+5004 H^2 k^2+6192\right) H^3-8 \sqrt{3} g^2 \left(1772 H^6 k^6+17121 H^4 k^4+55557 H^2 k^2+60426\right) U^2 H^2+g U^3 \left(8 \left(15 \sqrt{3} U H^6+416 \sqrt{g H^{13} \left(H^2 k^2+3\right)\right) k^6+9 \left(145 \sqrt{3} U H^4+3328  $\left(H^2 k^2+3\right) \ k^6+3 \left(H^2 k^2+3\right) \ h^{13} \left(H^2 k^2+3\right)$  $k^2+3\right) \ k^4+3 \left(675 \right) k^4+3 \left(675 \right) k^2 U^5+9984 \left(675 \right) k^4+3 \left(675 \right) k^$  $\label{eq:u^2+52352 sqrt{g^5 H^9 \left(\frac{h^2 k^2+3\right)}\right) h} $$ U^2+52352 \sqrt{4^2 k^2+3\right)} \ U^5+2816 \ \sqrt{6^5 k^2+3} \ U^5+2816 \ U^5+2816$  $H^5 \left(H^2 k^2+3\right)\right)\right) \left(H^2 k^2+3\right)\right)$  $k^2+3\right)^{7/2}\right)-\frac{1520}{q^2}$  $\label{eq:continuous} $$U^7 H^8+5760 \operatorname{sqrt}\{g^5 H^{21} \left(H^2 k^2+3\right) U^2+480 \operatorname{sqrt}\{g^7 H^{23} \left(H^2 k^2+3\right) U^2+480 \right) $$$ k^2+3\right)\right) k^8+3 \left(-55216 \sqrt{3} g^3 U H^9-41728 \sqrt{3} g^2 U^3 H^8+3 g U^4 \left(105 \sqrt{3} U+2048 \sqrt{g H \left(H^2 k^2+3\right)\right) H^7+300 \sqrt{3} U^7 H^6+39488  $\label{left} $$ H^{17} \left( H^2 k^2 + 3\right) U^2 + 6720 \left( g^7 H^{19} \left( H^2 k^2 + 3\right) \right) \right) $$ ight) $$ (H^2 k^2 + 3\right) \left( H^2 k$ k^6+9 \left(-99856 \sqrt{3} g^3 U H^7-66296 \sqrt{3} g^2 U^3 H^6+3 g U^4 \left(155 \sqrt{3})  $U+3072 \sqrt{4} H \left( \frac{A^2 k^2+3\right)}{H^5+450 \sqrt{3} U^7 H^4+88512 \sqrt{g^5 H^{13}}} \right)$  $\left(H^2 k^2+3\right) U^2+19040 \right(15) \left(H^2 k^2+3\right) k^4+27 \left(15\right)$ \sqrt{3} H^2 U^7+305 \sqrt{3} g H^3 U^5+6144 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^4-46960 \sqrt{3} g^2 H^4 U^3+82240 \sqrt{g^5 H^9 \left(H^2 k^2+3\right)} U^2-80544 \sqrt{3} g^3 H^5 U+20416 \sqrt{g^7 H^{11} \left(H^2 k^2+3\right)}\right) k^2+243 \left(25 \sqrt{3} U^7+g H \left(25) \sqrt{3} U+512 \sqrt{g H \left(H^2 k^2+3\right)\right) U^4-4168 \sqrt{3} g^2 H^2 U^3+9152  $\ \left( \frac{g^5 H^5 \left( H^2 k^2 + 3\right)}{U^2 - 8128 \left( 3 \right) g^3 H^3 U + 2592 \left( g^7 H^7 \left( H^2 \right) \right) } \right)$  $k^2+3\left( \frac{4t}^3}{30720 (g H)^{3/2} \left( \frac{4^2+3\left( \frac{4t}^3 \right)^{9/2}}{100} + \frac{4t}^3} \right) } \right)$  $\left(2 g H \left(4 \left(4 \right) \right) k^8+36 \right) \left(4 \right) k^2 + 3 \left(4 \left(4 \right) k^2 + 3 \right) k^8+3$  $U+238464 \sqrt{4} k^2 + 3\right) U^5-3 \sqrt{3} g^2 H^2 \left(H^2 k^2+3\right)^2$ \left(16944 H^4 k^4+114352 H^2 k^2+197625\right) U^4-24 \sqrt{3} g^3 H^3 \left(4080 H^8 k^8+64744 H^6 k^6+376029 H^4 k^4+953451 H^2 k^2+893700\right) U^2+3 \left(5 \left(15  $\sqrt{3} U^7 H^8+2048 \sqrt{21} \left( H^2 k^2+3\right) U^2+384 \sqrt{6^7 H^{23} \left( H^2 k^2+3\right)} U^2+384 \right)$  $k^2+3\right) \ h^6 U^7+20864 \ \ h^{17} \ h^6 U^7+20864 \ \ h^{17} \ h^6 U^7+20864 \ \ h^{17} \$  $\label{left} $$U^2+9600 \operatorname{sqrt}\{g^7 H^{19} \left( h^2 k^2+3\right)\right) h^6+18 \left( 225 \operatorname{sqrt}\{3\} H^4 U^7+100096 \right) h^6+18$ k^4+36 \left(225 \sqrt{3} H^2 U^7+5888 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^4+144512  $\left(\frac{9^5 H^9 \left(\frac{4^2 k^2+3\right)} U^2+105472 \right)}{11} \left(\frac{4^2 k^2+3\right)}\right)$ 

 $k^2+135 \left(45 \right) U^7+39424 \left(45 \right) U^7+39424$  $H^7 \left(H^2 k^2+3\right)\right) \ U-144 \ \ U-144 \ \ \ H^4 \left(40 H^8 k^8+1000 H^6\right)$ k^6+7395 H^4 k^4+22104 H^2 k^2+23832\right)\right)\text{dt}^4}{92160 (g H)^{3/2} \left(H^2  $k^2+3\right)^{9/2}+O\left(\frac{dx}^5\right)\right)$ 

Out[133]=

$$\begin{aligned} & \text{Out} \text{[134]=} \quad \text{EA} \parallel \quad \left\{ \left\{ 1 + \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, \text{H}^2 \, k^3 \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{(6 + 2 \, \text{H}^2 \, k^2) \, \text{w}}, \, \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, \text{H} \, k \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{2 \left( \text{H} + \frac{\text{H}^3 \, k^2}{3} \right) \, \text{w}} \right\}, \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \, \left( g \, \text{H} \, \left( 3 + \text{H}^2 \, k^2 \right) - 3 \, \text{U}^2 \right) \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{2} \right\}, \, 1 \, + \, \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \, \left( 6 + \text{H}^2 \, k^2 \right) \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{6 + 2 \, \text{H}^2 \, k^2 \right) \, w} \right\} \right\} \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \, \left( 6 + \text{H}^2 \, k^2 \right) \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{6 + 2 \, \text{H}^2 \, k^2 \right) \, w} \right\} \right\} \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \, \left( 6 + \text{H}^2 \, k^2 \right) \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{6 + 2 \, \text{H}^2 \, k^2 \right) \, w} \right\} \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \, \left( 6 + \text{H}^2 \, k^2 \right) \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{6 + 2 \, \text{H}^2 \, k^2 \right) \, w} \right\} \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \, \left( 6 + \text{H}^2 \, k^2 \right) \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{6 + 2 \, \text{H}^2 \, k^2 \right) \, w} \right\} \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}}{2} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \, \left( 6 + \text{H}^2 \, k^2 \right) \, w}{\left( 6 + 2 \, \text{H}^2 \, k^2 \right) \, w} \right\} \right\} \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}}{2} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \, \left( 6 + \text{H}^2 \, k^2 \right) \, w}{\left( 6 + 2 \, \text{H}^2 \, k^2 \right) \, w} \right\} \right\} \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}}{2} \left( 1 - e^{-i \, \text{dx} \, k} \right) \, \left\{ \frac{i \, \text{dx} \, k}{2} \, k \, \frac{i \, \text{dx}}{2} \, k \, \frac{i \, \text{dx}}{2} \,$$

Out[135]=  $EA \parallel \label{eq:entropy} \$ 

\begin{array}{cc}

 $\frac{i e^{\frac{1}{2}} \left(1-e^{-i \text{text}dx} k\right) \left(1-e^{i \cdot text}dx\right) \left(1$  $w \rightarrow H^2 U \csc \left( \frac{k}{2} \right) k^3 {\left( H^2 K^2 + 6 \right) w} + 1$ &  $\frac{i e^{\frac{i \cdot k}{2}} \left(1-e^{-i \cdot k} k\right)}{1-e^{i \cdot k}} \left(1-e^{-i \cdot k} k\right) \left(1-e^{-i \cdot k$  $w\}$ right)  $H \ \csc \left(\frac{dx}{k}^2\right)^{2}\left(\frac{k^2 H^3}{3}+H\right) w} \$ 

 $\frac{i e^{fac_i \cdot text_dx} k}{2}} \left[ \frac{-i \cdot text_dx}{k} \right] \left[ \frac{-1 + e^{i \cdot text_dx} w}{right} \right]$  $\label{left(H^2 k^2+3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2\right| (1 + 1) left(H^2 k^2 + 3\left| h(1) -3 U^2$  $w\} \& \frac{i e^{\int x_{dx} k}{2}} \left[ e^{-i \cdot x_{dx} k} \right] \\$  $k \left( H^2 k^2 + 6 \right) U \left( H^2 k^2 + 6 \right) U \left( H^2 k^2 + 6 \right)$ 

\end{array}

\right)

$$\begin{aligned} &\text{Out}[136] = \text{ Eerr } \| & \left\{ \left\{ \left( -\frac{(H^2 \, k^3 \, U \, w) \, dt^2}{2(3 + H^2 \, k^2)} - \frac{i \, H^2 \, k^3 \, U \, w^2 \, dt^3}{6(3 + H^2 \, k^2)} + \frac{H^2 \, k^3 \, U \, w^3 \, dt^4}{24(3 + H^2 \, k^2)} + O[dt]^5 \right) + \\ & \left( -\frac{1}{2} \left( \sqrt{g \, H} \, \, k^2 \right) \, dt + O[dt]^5 \right) \, dx + \left( \frac{i \, (9 \, H^2 \, k^3 + 2 \, H^4 \, k^7) \, U \, dt}{12(3 + H^2 \, k^2)^2} + O[dt]^5 \right) \, dx^2 + \left( \frac{1}{24} \sqrt{g \, H} \, \, k^4 \, dt + O[dt]^5 \right) \, dx^3 + \\ & \left( -\frac{i \, k^7 \, (54 \, H^2 \, U + 19 \, H^4 \, k^2 \, U + 2 \, H^6 \, k^4 \, U) \, dt}{240 \, (3 + H^2 \, k^2)^3} + O[dt]^5 \right) \, dx^4 + O[dx]^5, \\ & \left( -\frac{3 \, (k \, w) \, dt^2}{2(3 + H^2 \, k^2)} + \frac{k \, w^3 \, dt^4}{8(3 + H^2 \, k^2)} + O[dt]^5 \right) + \\ & \left( \frac{i \, (6 \, k^3 + H^2 \, k^3) \, dt}{4(3 + H^2 \, k^2)^2} + O[dt]^5 \right) \, dx^2 + \left( \frac{i \, (-54 \, k^3 + H^4 \, k^9) \, dt}{240 \, (3 + H^2 \, k^2)^3} + O[dt]^5 \right) \, dx^4 + O[dt]^5 \right) \, dx^4 + O[dt]^5 \right) + \\ & \left( \left( -\frac{(k \, (3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2) \, w) \, dt^2}{2(3 + H^2 \, k^2)} - \frac{i \, k \, (3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2) \, w^3 \, dt^4}{6(3 + H^2 \, k^2)} + O[dt]^5 \right) + \\ & \left( -\frac{1}{2} \left( \sqrt{g \, H} \, \, k^2 \, U \right) \, dt + O[dt]^5 \right) \, dx + \left( \frac{i \, (18 \, g \, H \, k^3 + 12 \, g \, H^3 \, k^3 + 2 \, g \, H^3 \, k^3 - 18 \, k^3 \, U^2 - 3 \, H^2 \, k^5 \, U^2) \, dt}{12(3 + H^2 \, k^2)} + O[dt]^5 \right) \, dx^2 + \\ & \left( \frac{1}{24} \sqrt{g \, H} \, \, k^4 \, U \, dt + O[dt]^5 \right) \, dx^3 + \left( -\frac{i \, (54 \, g \, H \, k^3 + 52 \, g \, H^3 \, k^3 + 18 \, g \, H^3 \, k^3 + 2 \, g \, H^7 \, k^{11} - 54 \, k^5 \, U^2 + H^4 \, k^9 \, U^2 \right) \, dt}{12(3 + H^2 \, k^2)} + O[dt]^5 \right) \, dx^4 + O[dt]^5 \right)$$

```
Out[137]= Eerr || \left(
                                                                  \begin{array}{cc}
                                                                       \left(-\frac{h^2 k^3 U w\right) \left(t^2 k^2 + 3 \right) - \frac{h^2 k^3 U w\right)}{t^2 k^3 U w\right) + \frac{h^2 k^3 U w\right)} - \frac{h^2 k^3 U w\right)} = \frac{h^2 k^3 U w}{t^3 U w}
                                                                                                                       U w^2 \text{text}\{dt\}^3\}\{6 \text{left}(H^2 k^2+3\text{right})\}+\text{frac}\{H^2 k^3 U w^3 \text{text}\{dt\}^4\}\{24 \text{left}(H^2 k^2+3\text{text})\}+\text{frac}\{H^2 k^3 U w^3 \text{text}\{dt\}^4\}\}+\text{frac}\{H^2 k^3 U w^3 \text{text}\{dt\}^4\}\}+\text{frac}\{H^2 k^3 U w^3 \text{text}\{dt\}^4\}+\text{frac}\{H^2 k^3 U w^3 U w^3 \text{text}\{dt\}^4\}+\text{frac}\{H^2 k^3 U w^3 U w^3
                                                                                                                       k^2+3\right)+O\left(\frac{dt}^5\right)+\left(\frac{dt}^5\right)+\left(\frac{1}{2}\left(\frac{1}{2}\right)+\frac{dt}{2}\right)
                                                                                                                       \text{dt}+O\left(\text{dt}}^5\right)\right)\text{dx}+\left(\frac{i \left(2 H^4 k^7+9 H^2 k^5\right) U
                                                                                                                       \label{eq:local_local_local_local_local_local} $$ \operatorname{local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_
                                                                                                                       \ \sqrt{g H} \ \text{dt}+O\left(\text{dt}}-\\frac{1}{c} \\right)\\right)\\text{dx}^3+\\left(-\\frac{1}{c} \\right)\\right)\\right)\\right
                                                                                                                       k^2 U H^4+54 U H^2\right) \text{dt}}{240 \left(H^2 k^2+3\right)^3}+O\left(\text{dt}\^5\right)\right)
                                                                                                                       \text{dx}^4+O\left(\frac{dx}^5\right) & \left(-\frac{3 (k w) \text{d}^2}{2 \left(\frac{H^2}{2}\right)} \right)
                                                                                                                       \label{left} $$ k^2+3\right)-\frac{k^2}{2 \left( k^2+3\right)}-\frac{k^2}{2 \left( k^2+3\right)}+\frac{k^2}{2 \left( k^2+3\right)}+\frac{k^
                                                                                                                       \label{left(H^2 k^5+6 k^3 right)} + O\left(\frac{dt}{5}\right) + \left(\frac{dt}{5}\right) + \left(\frac{dt}{5}\right)
                                                                                                                       k^2+3\right)^2+O\left(\frac{t}{5\right)}\right)
                                                                                                                       \t (text{dt}^2 40 \left( \frac{A^2 + 3\right)^3}{-0} \right) \t (text{dt}^5 \right) \t (text{dx}^4 + O\left( \frac{A^2 + 3\right)^3}{-0} \right) \t (text{dx}^6 - 1) 
                                                                       \label{left} $\left(-\frac{k^2 H^3+3 g H-3 U^2\right) w\right) \operatorname{left}(h^2 k^2+3\right)^{-\frac{1}{2}} (h^2 k^2+3\right)^{-\frac{1}{2}} \left(-\frac{k^2 H^3+3 g H-3 U^2\right) \left(-\frac{k^2 H^3+3 g H-3 U^2\right)^{-\frac{1}{2}} (h^2 k^2+3)^{-\frac{1}{2}} (h^2 k^2+3)^{-\frac{
                                                                                                                     \label{eq:left} $$\left(g \ k^2 \ H^3 + 3 \ g \ H - 3 \ U^2\right) \ w^2 \ \ker\{dt\}^3\} \ \left(\left(H^2 \ k^2 + 3\right)\right) + \frac{k^2 \ k^2 \ H^3 + 3 \ g}{k^2 \ H^3 + 3 \ g} \ \left(h^2 \ H^3 + 3 \ g \ H^3 + 3 \ g\right) \right) + \frac{k^2 \ h^3 + 3 \ g}{k^2 \ H^3 + 3 \ g} \ \left(h^2 \ H^3 + 3 \ g 
                                                                                                                       H-3 U^2 + W^3 \text{ } 
                                                                                                                       \left(\sqrt{g H} k^2 U\right) \text{dt}+O\left(\text{dt}\^5\right)\right) \text{dx}+\left(\frac{i} \left(2
                                                                                                                       \text{text}\{dt\}+O\left(\frac{dt}^5\right)\right) \cdot \left(\frac{dx}^3+\left(\frac{dx}^3+\frac{dx}^3+\frac{dx}^3\right)\right)
                                                                                                                       H<sup>5</sup> k<sup>9</sup>+H<sup>4</sup> U<sup>2</sup> k<sup>9</sup>+54 g H<sup>3</sup> k<sup>7</sup>-54 U<sup>2</sup> k<sup>5</sup>+54 g H k<sup>5</sup> right) \text{dt}}{240 \left(H<sup>2</sup>
                                                                                                                       \label{left} $$k^2+3\right)^3+O\left(\frac{dt}^5\right)\right) \cdot \left(\frac{dx}^4+O\left(\frac{dx}^5\right)\right) & \left(\frac{dx}^5\right) \cdot \left(\frac{dx}^6\right) + O\left(\frac{dx}^6\right) + O\left(\frac{dx}^6\right) - O\left(\frac{dx}^6\right) + O\left(\frac{dx}^6\right)
                                                                                                                       \left(H^2 k^2+6\right) \cup \left(H^2 k^2+6\right) - \left(k^2 k^2+6\right) 
                                                                                                                       k^2+6\right) U w^2 \left(H^2 k^2+3\right)+\frac{k \left(H^2 k^2+6\right) U w^3
                                                                                                                       \label{eq:left} $$ \operatorname{dt}^4_{24}\left(\frac{h^2 k^2+3\right)}+O\left(\frac{t}{t}\right)^5\right)\right)+\left(-\frac{1}{2}\left(\frac{1}{2}\right)^2\right)$
                                                                                                                       H_k^2\right) \to \frac{dt}{+0}\left(\frac{dt}{-0}\right) + \frac{dt}{+0}\left(\frac{dt}{-0}\right) + \frac{dt}{+0}
                                                                                                                       H^2 U k^5+36 U k^3 \right) \left( \frac{dt}{12} \left( \frac{k^2 + 3 \right)^2}{+O\left( \frac{dt}{5} \right)} \right) \left( \frac{dt}{5} \right) \right)
                                                                                                                       \left(2 H^6 U k^{11}+17 H^4 U k^9+54 H^2 U k^7+108 U k^5\right) \text{dt}}{240 \left(H^2
                                                                                                                       k^2+3\right) + O\left(text{dt}^5\right) \cdot text{dx}^4+O\left(text{dx}^5\right) \cdot text{dx}^6
                                                                    \end{array}
                                                                  \right)
        \ln[138] = \text{KurF} = (\text{fm} * \text{ap} - \text{fp} * \text{am} + \text{am} * \text{ap} * (\text{qp} - \text{qm})) / (\text{ap} - \text{am});
                                                                  KurFWS = KurF /. ap \rightarrow (U + Sqrt[g * H]) /. am \rightarrow 0;
                                                                  KurFWSeta =
                                                                                            KurFWS /. fp \rightarrow (H * v + U * Rpp * n) /. fm \rightarrow (H * v + U * Rmp * n) /. qp \rightarrow Rpp * n /.
                                                                                                             qm \rightarrow Rmp * n;
                                                                  KurFWSeta = KurFWSeta / . v \rightarrow (GGp * G + Gnp * n);
                                                                  Kfnnp = FullSimplify[KurFWSeta /. G \rightarrow 0 /. n \rightarrow 1];
```

Kfnn = Kfnnp /. Rpp  $\rightarrow$  Rp /. Rmp  $\rightarrow$  Rm /. GGp  $\rightarrow$  GG2 /. Gnp  $\rightarrow$  Gn2;

```
KfnG = KfnGp / Rpp \rightarrow Rp / Rmp \rightarrow Rm / GGp \rightarrow GG2 / Gnp \rightarrow Gn2;
Fnn2 = -dt * (1 - Exp[-I * k * dx]) / dx * Kfnn;
Fnn2TA = Series[Fnn2 - FnnA, {dx, 0, 3}, {dt, 0, 3}];
Fnn2TAr = Refine[Fnn2TA, \{k > 0, U > 0, H > 0, g > 0\}];
FnG2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfnG;
FnG2TA = Series[FnG2 - FnGA, {dx, 0, 3}, {dt, 0, 3}];
FnG2TAr = Refine[FnG2TA , \{k > 0, U > 0, H > 0, g > 0\}];
KurFWSG = KurFWS /. fp \rightarrow (U*Rpp*G + U*H*v + g*H*Rpp*n) /.
       fm \rightarrow (U * Rmp * G + U * H * V + g * H * Rmp * n) / . qp \rightarrow Rpp * G / . qm \rightarrow Rmp * G;
KurFWSG = KurFWSG / . v \rightarrow (GGp * G + Gnp * n);
KfGnp = FullSimplify[KurFWSG /. G \rightarrow 0 /. n \rightarrow 1];
KfGGp = FullSimplify[KurFWSG /. n \rightarrow 0 /. G \rightarrow 1];
KfGn = KfGnp / . Rpp \rightarrow Rp / . Rmp \rightarrow Rm / . GGp \rightarrow GG2 / . Gnp \rightarrow Gn2;
\texttt{KfGG} \; = \; \texttt{KfGGp} \; / \; . \; \mathsf{Rpp} \; \rightarrow \; \mathsf{Rp} \; \; / \; . \; \; \mathsf{Rmp} \; \rightarrow \; \mathsf{Rm} \; \; / \; . \; \; \mathsf{GGp} \; \rightarrow \; \mathsf{GG2} \; \; / \; . \; \; \mathsf{Gnp} \; \rightarrow \; \mathsf{Gn2} \; ;
FGn2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfGn;
FGn2TA = Series[FGn2 - FGnA, {dx, 0, 3}, {dt, 0, 3}];
FGn2TAr = Refine[FGn2TA, \{k > 0, U > 0, H > 0, g > 0\}];
fGG2 = U * H * GG2 + U / 2 * (Rm + Rp) - (Sqrt[g*H]) / (2) * (Rp - Rm);
FGG2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfGG;
FGG2TA = Series[FGG2 - FGGA, {dx, 0, 4}, {dt, 0, 3}];
FGG2TAr = Refine[FGG2TA, \{k > 0, U > 0, H > 0, g > 0\}];
Fmat2 = {{Fnn2, FnG2}, {FGn2, FGG2}};
Emat2 = IdentityMatrix[2] + Fmat2;
Eerr = Series[Emat2 - EA, {dx, 0, 4}, {dt, 0, 4}];
EigvFmat2 = Eigenvalues[Fmat2];
RKStep = Log[1 + EigvFmat2] / (I * dt);
RKstepTay = Series[RKStep, {dx, 0, 4}, {dt, 0, 4}];
RKstepTayr = Simplify[-RKstepTay - \{wAp, wAm\}, \{k > 0, H > 0, g > 0, U > 0\}];
Text[Row[{" U > Sqrt(gH)"}]]
Text[" "]
Text[Row[{"Fnn || ", Kfnnp}]]
Text[Row[{"Fnn || ", TeXForm[Kfnnp]}]]
Text[Row[{"Fnn error || ", Fnn2TAr}]]
Text[Row[{"Fnn error || ", TeXForm[Fnn2TAr]}]]
Text[" "]
Text[Row[{"FnG || ", KfnGp}]]
Text[Row[{"FnG || ", TeXForm[KfnGp]}]]
Text[Row[{"FnG error || ", FnG2TAr}]]
```

```
Text[Row[{"FnG error ||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ", TeXForm[FnG2TAr]}]]
                                                                                             Text[" "]
                                                                                           Text[Row[{"FGn || ", KfGnp}]]
                                                                                             Text[Row[{"FGn || ", TeXForm[KfGnp]}]]
                                                                                             Text[Row[{"FGn error ||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ", FGn2TAr}]]
                                                                                             Text[Row[{"FGn error ||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ", TeXForm[FGn2TAr]}]]
                                                                                             Text[" "]
                                                                                             Text[Row[{"FGG ||
                                                                                                                                                                                                                                                                                                                                                                                                                                                ", KfGGp}]]
                                                                                             Text[Row[{"FGG ||
                                                                                                                                                                                                                                                                                                                                                                                                                                           ", TeXForm[KfGGp]}]]
                                                                                             Text[Row[{"FGG error ||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ", FGG2TAr}]]
                                                                                             Text[Row[{"FGG error ||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ", TeXForm[FGG2TAr]}]]
                                                                                             Text[" "]
                                                                                             Text[" "]
                                                                                             Text[Row[{"Omega error ||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ", RKstepTayr}]]
                                                                                             Text[Row[{"Omega error
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ", TeXForm[RKstepTayr]}]]
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          - 11
                                                                                             Text[" "]
                                                                                             Text[Row[{"EA ||
                                                                                                                                                                                                                                                                                                                                                                                                               ", EA}]]
                                                                                             Text[Row[{"EA || ", TeXForm[EA]}]]
                                                                                             Text[Row[{"Eerr || ", Eerr}]]
                                                                                             Text[Row[{"Eerr || ", TeXForm[Eerr]}]]
Out[172]= U > Sqrt(gH)
  Out[173]=
  Out[174]= Fnn || Gnp H + Rmp U
  Out[175]= Fnn || \text{text}\{Gnp\}\ H+\text{text}\{Rmp\}\ U
Out[176]= Fnn error || \left(-\frac{(H^2 k^3 U w) dt^2}{2(3+H^2 k^2)} - \frac{i H^2 k^3 U w^2 dt^3}{6(3+H^2 k^2)} + O[dt]^4\right) +
                                                                                                                                  \left(-\frac{1}{2} \left(k^2 \text{ U}\right) \text{d}t + \text{O[dt]}^4\right) \text{d}x + \left(\frac{i \left(9 \text{ H}^2 \text{ } k^5 + 2 \text{ H}^4 \text{ } k^7\right) \text{U d}t}{12 \left(3 + \text{H}^2 \text{ } k^2\right)^2} + \text{O[dt]}^4\right) \text{d}x^2 + \left(\frac{1}{24} \text{ } k^4 \text{ U d}t + \text{O[dt]}^4\right) \text{d}x^3 + \text{O[dx]}^4
Out[177]= Fnn error ||
                                                                                                                \label{left} $\left(-\frac{t_4t_4t_5^2 \left(\frac{t_4^2 k^3 U w\right)}{2 \left(\frac{t_4^2 k^2 + 3\right)} - \frac{t_4^3 U w^2}{6}}\right)^2 \left(\frac{t_4^2 k^3 U w^2}{6}\right)^2 \left(\frac{t_4^2 k^
                                                                                                                                                              \label{left} $$\left(H^2 k^2+3\right)+O\left(\frac{dt}^4\right)\right)+\left(\frac{dt}^4\right)+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+\left(\frac{dt}^4\right)^2+
                                                                                                                                                              U = U + O \left( \frac{dt}{4} - \frac{dt}{4} \right) + U = \frac{dt}{4} - 
                                                                                                                                                               k^5 + U \left( \frac{dt}{dt} \right) + \left
                                                                                                                                                              \left(\frac{1}{24} k^4 U \left(\frac{dt}+O\left(\frac{dt}^4\right)\right)\right) + O\left(\frac{dt}^4\right) + O\left(\frac{
  Out[178]=
Out[179]= FnG \parallel GGp H
  Out[180]= FnG \parallel \text{text}\{GGp\} H
 \text{Out} \\ \text{[181]=} \quad FnG \ error \ || \ \left( -\frac{3 \ (k \ w) \ dt^2}{2 \left( 3 + H^2 \ k^2 \right)} - \frac{i \ k \ w^2 \ dt^3}{2 \left( 3 + H^2 \ k^2 \right)} + O[dt]^4 \right) \\ + \left( \frac{i \left( 6 \ k^3 + H^2 \ k^5 \right) \ dt}{4 \left( 3 + H^2 \ k^2 \right)^2} + O[dt]^4 \right) dx^2 \\ + O[dx]^4 + \left( \frac{1}{4} \left( 3 + H^2 \ k^2 \right) \ dt + O[dt]^4 \right) dx^2 \\ + O[dx]^4 + O[dx]^
```

Out[183]=

 $\label{eq:outsign} \hbox{Out[184]= } FGn \ || \ H\left(g\,Rmp+Gnp\,U\right)$ 

 $\label{eq:out_185} \text{Out}_{\texttt{[185]=}} \ FGn \ || \ H (g \text{\texttt{kext}}\{Rmp\} + \text{\texttt{kext}}\{Gnp\} \ U)$ 

$$\begin{array}{l} \text{Out} \text{[186]=} \quad FGn \; error \; \mid \mid \; \left( -\frac{\left( k \left( 3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2 \right) w \right) dt^2}{2 \left( 3 + H^2 \, k^2 \right)} - \frac{i \, k \left( 3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2 \right) w^2 \, dt^3}{6 \left( 3 + H^2 \, k^2 \right)} + O[dt]^4 \right) + \left( -\frac{1}{2} \left( g \, H \, k^2 \right) dt + O[dt]^4 \right) dx \, + \\ \left( \frac{i \left( 18 \, g \, H \, k^3 + 12 \, g \, H^3 \, k^5 + 2 \, g \, H^5 \, k^7 - 18 \, k^3 \, U^2 - 3 \, H^2 \, k^5 \, U^2 \right) dt}{12 \left( 3 + H^2 \, k^2 \right)^2} + O[dt]^4 \right) dx^2 \, + \left( \frac{1}{24} \, g \, H \, k^4 \, dt + O[dt]^4 \right) dx^3 \, + O[dx]^4 \end{array}$$

Out[187]= FGn error |

 $\label{left-def} $$\left(-\frac{dt}^2 \left( H^3 k^2 + 3 g H - 3 U^2\right)\right)_{2 \left( H^2 k^2 + 3\right)}-\frac{1}{4} \left( H^2 k^2 + 3 g H - 3 U^2\right)_{6 \left( H^2 k^2 + 3 U^2\right)_{6 \left( H^2 k^2 + 3 U^2\right)_{6 \left( H^2 k^2 + 3 U^2$ 

 $k^2+3\left(\frac{1}{2}\left(\frac{1}{2}\right)+O\left(\frac{1}{2}\right)\right)$ 

 $H k^2\right) \operatorname{text} dt+O\left(\operatorname{text} dt\right)^4\right) + \operatorname{text} dx^2 \left(\operatorname{text} dt\right)^4\right)$ 

\left(2 g H^5 k^7+12 g H^3 k^5-3 H^2 U^2 k^5-18 U^2 k^3+18 g H k^3\right)

 $\text{dt}{12 \left(H^2 k^2+3\right)^2}+O\left(\frac{dt}^4\right)\right)+\left(\frac{dt}^4\right)+\left(\frac{dt}^4\right)^2$ 

 $\left(\frac{1}{24} g H k^4 \left(\frac{dt}{+0}\right)\right) + O\left(\frac{1}{24} g H k^4 \left(\frac{dt}{+0}\right)\right) + O\left(\frac{dt}{+0}\right) + O\left(\frac{dt}{+0}\right)$ 

Out[188]=

Out[189]=  $FGG \parallel (GGp H + Rmp) U$ 

Out[190]=  $FGG \parallel U (\text{text}\{GGp\} H+\text{text}\{Rmp\})$ 

Out[191]= FGG error |

$$\left(-\frac{\left(k\left(6+H^{2}\,k^{2}\right)U\,w\right)dt^{2}}{2\left(3+H^{2}\,k^{2}\right)}-\frac{i\,k\left(6+H^{2}\,k^{2}\right)U\,w^{2}\,dt^{3}}{6\left(3+H^{2}\,k^{2}\right)}+O[dt]^{4}\right)+\left(-\frac{1}{2}\left(k^{2}\,U\right)dt+O[dt]^{4}\right)dx+\left(\frac{i\left(36\,k^{3}+15\,H^{2}\,k^{5}+2\,H^{4}\,k^{7}\right)U\,dt}{12\left(3+H^{2}\,k^{2}\right)^{2}}+O[dt]^{4}\right)dx^{2}+\\ \left(\frac{1}{24}\,k^{4}\,U\,dt+O[dt]^{4}\right)dx^{3}+\left(-\frac{i\left(108\,k^{5}+54\,H^{2}\,k^{7}+17\,H^{4}\,k^{9}+2\,H^{6}\,k^{11}\right)U\,dt}{240\left(3+H^{2}\,k^{2}\right)^{3}}+O[dt]^{4}\right)dx^{4}+O[dx]^{5}$$

Out[192]= FGG error |

 $\label{left-frac} $$\left(-\frac{\left(t_{0} \times 2+6\right)}{2 \left(H^{2} k^{2}+6\right)}_{0}^{2} \left(H^{2} k^{2}+3\right)}_{0}^{2} \left($ 

Out[193]=

Out[194]=

Out[195]= Omega error || 
$$\left\{ \left( \frac{i \left( \sqrt{3} \cdot k \sqrt{g \cdot H (3 + H^2 \cdot k^2)} + 3 \cdot k \cdot U + H^2 \cdot k^3 \cdot U \right)^2 dt}{2 \cdot (3 + H^2 \cdot k^2)^2} - \frac{1}{3 \cdot (3 + H^2 \cdot k^2)^2} - \frac{1}{3 \cdot (3 + H^2 \cdot k^2)^2} \right) \right\}$$

$$\begin{split} & \left[\frac{\imath \left[-\sqrt{3} \ \, k \sqrt{g \, H \, (3+H^2 \, k^2)} \right. + 38 \, U \, H^2 \, k^2 \, U\right]}{2 \, (3+H^2 \, k^2)} \, ds^4 + O[dx]^5, \\ & \left[\frac{\imath \left[-\sqrt{3} \ \, k \sqrt{g \, H \, (3+H^2 \, k^2)} \right. + 38 \, U \, H^2 \, k^2 \, U\right]}{2 \, (3+H^2 \, k^2)^2} \, ds^4 + O[dx]^5, \\ & \left(3 \, g \, H + U \left(-2 \, \sqrt{3} \ \, \sqrt{g \, H \, (3+H^2 \, k^2)} \right. + (3+H^2 \, k^2) \, U\right)\right) dt^2 - \\ & \frac{1}{4 \, (1+H^2 \, k^2)^3} \, \dot{\imath} \, \dot{\imath} \, \dot{\imath} \, \dot{\imath} \, \left(-\sqrt{3} \ \, \sqrt{g \, H \, (3+H^2 \, k^2)} \right. + (3+H^2 \, k^2) \, U\right)\right) dt^2 - \\ & \frac{1}{4 \, (1+H^2 \, k^2)^3} \, \dot{\imath} \,$$

$$\begin{split} \left(ik^4 \left(gH\left(-144\sqrt{gH(3+H^2k^2)}\right) + \sqrt{3} \left(369 + 234H^2k^2 + 37H^4k^4\right)U\right) - \\ & 4\left(63\sqrt{gH(3+H^2k^2)}\right)U^2 + 7k^4\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & 3k^2 \left(3\sqrt{g^3H^7(3+H^2k^2)} + 14\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & (\left(k^5 \left(\sqrt{3}\sqrt{gH(3+H^2k^2)} - (3+H^2k^2)U\right)\right)\left(gH\left(171\sqrt{gH(3+H^2k^2)}\right) - \sqrt{3} \left(477 + 306H^2k^2 + 49H^4k^4\right)U\right) + 5\left(72\sqrt{gH(3+H^2k^2)}\right)U^2 + 8k^4\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & 49H^4k^4\right)U\right) + 5\left(72\sqrt{gH(3+H^2k^2)}\right)U^2 + 8k^4\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & 3k^2 \left(3\sqrt{g^3H^7(3+H^2k^2)} + 16\sqrt{gH^3(3+H^2k^2)}\right)U^2 + 8k^4\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & \left(468\sqrt{gH(3+H^2k^2)}\right)U^2 + 52k^4\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & gH\left(198\sqrt{gH(3+H^2k^2)}\right)U^2 + 52k^4\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & gH\left(198\sqrt{gH(3+H^2k^2)}\right)U^2 + 52\sqrt{gH^3(3+H^2k^2)}\right)U^2 + \\ & gH\left(198\sqrt{gH(3+H^2k^2)}\right)U^2 + 52\sqrt{gH^3(3+H^2k^2)}\right)U^2 + \\ & gH\left(225\sqrt{gH(3+H^2k^2)}\right)U^3 \left(576\sqrt{gH(3+H^2k^2)}\right)U^2 + 64k^4\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & gH\left(225\sqrt{gH(3+H^2k^2)}\right)U^3 \left(693 + 450H^2k^2 + 73H^4k^4\right)U\right) + \\ & 3k^2\left(21\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 128\sqrt{gH^5(3+H^2k^2)}\right)U^3 \right)d^4 \right) \left/ \left(96\sqrt{gH}\left(3+H^2k^2\right)^{11/2}\right) + \\ O(dt)^3 dx^2 + \left(\frac{ik!}{(-\sqrt{3}gH(3+H^2k^2)}\right)U^2 + k^4\sqrt{gH^9(3+H^2k^2)}\right)U^2 + \\ & k^2\left(\sqrt{g^3H^7(3+H^2k^2)}\right)U^2 + k^4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + \\ \left(k^5\left(gH\left(-72\sqrt{gH(3+H^2k^2)}\right)U^3 + 4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + \\ \left(k^6\left(9\sqrt{3}g^2H^2(13+3H^2k^2)\right)U^3 + k^4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + 2k^2\left(2\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + \\ 32\left(9\sqrt{gH(3+H^2k^2)}\right)U^3 + k^4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + 2k^2\left(2\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + 2k^2\left(2\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + 2k^2\left(2\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + 2k^2\left(2\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{gH^9(3+H^2k^2)}\right)U^3 + 2k^2\left(2\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 3k^2\left(39\sqrt{gH(3+H^2k^2)}\right)U^3 + 32k^2\left(39\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 32k^2\left(39\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{g^3H^9(3+H^2k^2)}\right)U^3 + 3k^2\left(39\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{g^3H^9(3+H^2k^2)}\right)U^3 + 3k^2\left(39\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{g^3H^9(3+H^2k^2)}\right)U^3 + 3k^2\left(39\sqrt{g^3H^7(3+H^2k^2)}\right)U^3 + 4\sqrt{g^3H^9(3+H^2k^2)}$$

$$\left(384 \left(\sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right)\right) - \left(ik^8 \left(\sqrt{3} \sqrt{gH} (3 + H^2 k^2) - (3 + H^2 k^2) U\right)^2 \left(5 \sqrt{3} g^2 H^2 + (45 + 11 H^2 k^2) + gH U \left(-990 \sqrt{gH} (3 + H^2 k^2) + \sqrt{3} (1449 + 930 H^2 k^2 + 149 H^4 k^4) U\right) - 2 \left(360 \sqrt{gH} (3 + H^2 k^2) U^3 + 40 k^4 \sqrt{gH^9} (3 + H^2 k^2) U^3 + k^2 \left(137 \sqrt{g^3 H^7} (3 + H^2 k^2) U + 240 \sqrt{gH^3} (3 + H^2 k^2) U^3\right)\right) dt^4\right) / \left(128 \sqrt{gH} \left(3 + H^2 k^2\right)^{9/2}\right) + O[dt]^5 dt^3 + 4 \left(\sqrt{gH^9} (3 + H^2 k^2) U\right)\right) / \left(30720 \sqrt{gH} \left(3 + H^2 k^2\right)^{5/2}\right) + \left(ik^6 \left(-3 gH \left(-18432 \sqrt{gH} (3 + H^2 k^2) \right) U\right)\right) / \left(30720 \sqrt{gH} \left(3 + H^2 k^2\right)^{5/2}\right) + 1381 \sqrt{3} H^6 k^6 U + k^4 \left(-960 \sqrt{gH^9} (3 + H^2 k^2) + 13717 \sqrt{3} H^2 U\right)\right) + 128 \left(837 \sqrt{gH} (3 + H^2 k^2) U^2 + 279 k^4 \sqrt{gH^9} (3 + H^2 k^2) U^2 + 31 k^6 \sqrt{gH^{13}} (3 + H^2 k^2) U^2 + 27 k^2 \left(7 \sqrt{g^3 H^7} (3 + H^2 k^2) + 31 \sqrt{gH^9} (3 + H^2 k^2) U^2\right)\right) dt / \right)$$

$$\left(92 160 \sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right) + \left(k^7 \left(9 \sqrt{3} g^2 H^2 \left(12 2999 + 6258 H^2 k^2 + 775 H^4 k^4\right) + 8053 \sqrt{3} U\right) - 3 k^4 \left(12 288 \sqrt{gH^9} (3 + H^2 k^2) U^3\right)\right) dt / \right)$$

$$\left(92 160 \sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right) + \left(3 H^2 k^2\right) U^3 + 774 k^4 \sqrt{gH^9} (3 + H^2 k^2) U^3\right) dt / \right)$$

$$\left(92 160 \sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right) + \left(3 H^2 k^2\right) U^3 + 774 k^4 \sqrt{gH^9} (3 + H^2 k^2) U^3\right) dt / \right)$$

$$\left(92 160 \sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right) + \frac{1}{30720 \sqrt{gH} \left(1 + H^2 k^2\right)} U^3 + 286 k^6 \sqrt{gH^{13}} \left(3 + H^2 k^2\right) U^3 + 9k^2 \left(229 \sqrt{g^3 H^7} (3 + H^2 k^2) U^3 + 258 \sqrt{gH^9} (3 + H^2 k^2) U^3\right) dt / \right)$$

$$\left(92 160 \sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right) - \frac{1}{30720 \sqrt{gH} \left(1 + H^2 k^2\right)} U + 258 \sqrt{gH^3} \left(3 + H^2 k^2\right) U^3 + 9k^2 \left(229 \sqrt{g^3 H^7} \left(3 + H^2 k^2\right) U^3 + 258 \sqrt{gH^9} \left(3 + H^2 k^2\right) U^3\right) dt / \right)$$

$$\left(92 160 \sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right) - \frac{1}{30720 \sqrt{gH} \left(1 + H^2 k^2\right)} U^3 + 259 \sqrt{gH} \left(3 + H^2 k^2\right) U^3 + 24 gH^2 \left(29 \sqrt{g^3 H^7} \left(3 + H^2 k^2\right) U^3 + 259 \sqrt{gH} \left(3 + H^2 k^2\right) U^3\right) dt / \right)$$

$$\left(92 160 \sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right) - \frac{1}{30720 \sqrt{gH} \left(1 + H^2 k^2\right)} U^3 + 259 \sqrt{gH} \left(3 + H^2 k^2\right) U^3 + 24 gH^2 U^3\right) dt / \right)$$

$$\left(92 160 \sqrt{gH} \left(3 + H^2 k^2\right)^{7/2}\right$$

 $\left(k^{9}\left(\sqrt{3}\ \sqrt{g\,H\left(3+H^{2}\,k^{2}\right)}\ -\left(3+H^{2}\,k^{2}\right)U\right)\left(k^{8}\,U^{3}\left(-111\,559\,\sqrt{3}\ g\,H^{9}+42\,368\,\sqrt{g\,H^{17}\left(3+H^{2}\,k^{2}\right)}\ U\right)+42\,368\,\sqrt{g\,H^{17}\left(3+H^{2}\,k^{2}\right)}\right)$  $27\,k^{2} \left(18\,078\,\sqrt{\,g^{5}\,H^{9} \left(3\,+\,H^{2}\,k^{2}\right)}\,-172\,047\,\sqrt{\,3\,}\,g^{2}\,H^{4}\,U\,+\,372\,075\,\sqrt{\,g^{3}\,H^{7} \left(3\,+\,H^{2}\,k^{2}\right)}\,\,U^{2}\,-120\,H^{2} \left(18\,H^{2}\,k^{2}\right)\right)$  $477\,940\,\sqrt{3}\,g\,H^3\,U^3+169\,472\,\sqrt{g\,H^5\left(3+H^2\,k^2\right)}\,\,U^4\Big)+$  $g H^5 U^2 \left(347651 \sqrt{g H \left(3 + H^2 k^2\right)} - 700818 \sqrt{3} U\right)\right) +$  $81 \left(11\,603\,\sqrt{\,g^5\,H^5\left(3+H^2\,k^2\right)}\right. \\ \left.-63\,917\,\sqrt{\,3\,}\,g^2\,H^2\,U + 42\,368\,\sqrt{\,g\,H\left(3+H^2\,k^2\right)}\right. \\ \left.U^4 + 42\,24\,24\,24\,24$  $g H U^{2} \left(132513 \sqrt{g H \left(3 + H^{2} k^{2}\right)} - 122207 \sqrt{3} U\right)\right) 3\ k^{6}\ U\left(45\ 573\ \sqrt{3}\ g^{2}\ H^{8}-169\ 472\ \sqrt{g\ H^{13}\left(3+H^{2}\ k^{2}\right)}\ U^{3}+\right.$ 

## Out[196]= Omega error ||

\left\\frac{i \left(H^2 U k^3+3 U k+\sqrt{3} \sqrt{g H \left(H^2 k^2+3\right)} k\right)\^2 \text{dt}}\{2 \left(H^2  $\label{eq:left(H^2 k^2+3\right)} $$ k^2+3\right) -\frac{h^2 k^2+3\left(H^2 k^2+3\right)} U+\sqrt{3} \sqrt{3} \left(H^2 k^2+3\right)\right) + \frac{h^2 k^2+3\left(H^2 k^2+3\right)}{H^2 k^2+3\left(H^2 k^2+3\right)} $$$  $\left(3 g H+U \left(\frac{H^2 k^2+3\right)}{U+2 \left(\frac{3 g H+U \left(\frac{H^2 k^2+3\right)}{U+2 \left(\frac{3 g H+U \left(\frac{H^2 k^2+3\right)}{U+2 \left(\frac{3 g H+U \left(\frac{H^2 k^2+3\right)}{U+2 \left(\frac{1 g H+U \left(\frac{1 g H+U}\right)}{1 g H+U \left(\frac{1 g H+U}\right)}{1 g H+U \left(\frac{1 g H+U \left(\frac{1 g H+U}\right)}{1 g H+U \left(\frac{1 g H+U}\right)}{1 g H+U \left(\frac{1 g H+U}\right)}{1 g H+U}\right)}\right)}\right)}\right)}}\right)}}}\right)}}}$  $\t text{dt}^2{3 \left( h^2 k^2 + 3\right)} - \frac{k^4 \left( h^2 k^2 + 3\right) U + \frac{3} {2} \left( h^2 k^2 + 3\right) U$  $k^2+3\right) \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \right) \right) \right) \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \right) \right) \right) \right)$  $k^2 + 9 \left( U + \sqrt{3} \right) U^2 + 3 \left( U + \sqrt{3}$  $\label{eq:left} $\operatorname{H}\left(H^2 k^2+3\right) H\right) + \operatorname{left}(H^2 k^2+3\right) + \frac{1}{4}\left(H^2 k^2+3\right) + \frac{1$  $k^2+3\right) U+\sqrt{3} \sqrt{4 U k^4+2 \left(H^2 U k^2+3\right)} U+\sqrt{3} \left(H^4 U k^4+2 \left(H^2 U k^4+2\right)\right) U+\sqrt{3} U$  $\$  \sqrt{3} \sqrt{g H^5 \\left(H^2 k^2+3\right)}\right) \\ k^2+9 U+12 \\sqrt{3} \\sqrt{g H \\left(H^2 k^2+3\right)}\right) \\ right)}\right)  $H^2\left(\frac{dt}^4}{5\left(\frac{dt}^4}\right) \left(\frac{dt}^4}{5\left(\frac{dt}^4}\right)^3} + O\left(\frac{dt}^4\right)^3\right) + O\left(\frac{dt}^4\right)^3 + O\left(\frac{dt}^4\right)$  $\label{left} $\left(2 U + \sqrt{\frac{2} + \frac{4^2 + 3}{\sinh(1+\frac{2} + 2+3)}\right) + \frac{6^2 + \frac{4^2 + 3}{\sinh(1+\frac{2} + 2+3)}}{\sinh(1+\frac{2} + 2+3)} \right) $$$  $H \left( H^2 k^2 + 3\right) \left($  $\left( H^2 k^2+3\right)^{3/2}+\frac{k^4 \left( \sqrt{3} gH+2 \right)^2 H^2 k^2+3\right)^{3/2}+\frac{k^4 \left( \sqrt{3} gH+2 \right)^2 H^2 k^2+3\right)^{3/2}$  $U = U + U \left( \frac{3 + U \left( \frac{4^2 k^2 + 3\right) U + 2 \left( \frac{3}{3} \right) }{1 + U \left( \frac{4^2 k^2 + 3\right) \left( \frac{4^2 k^2 + 3\right) }{1 + U \left( \frac{4^2 k^2$  $\t t_{dt}^2_{4 \operatorname{Sqrt}\{g H\}} \left( \frac{3}{2} - \frac{1}{3} \right)^{3/2} - \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H \right)^{2} + \frac{1}{3} g H + 2 \operatorname{Sqrt}\{g H + 2 \operatorname{Sq$ \left(H^2 k^2+3\right)\ U\right) \left(\left(H^4 U k^4+3 \left(2 U H^2+\sqrt{3} \sqrt{g H^5 \left(H^2  $k^2+3\right) \left( \frac{k^2+3\right)}{right} k^2+9 \left( \frac{k^2+3\right)}{right} \right) U^2+3 g \left( \frac{k^2+3\right)}{right} U^2+3 g \left( \frac{k^2+3\right)}{right} \right) U^2+3 g \left( \frac{k^2+3\right)}{right} U^2+3 g \left( \frac{k^2+3}{right} U^2+3 g (\frac{k^2+3}{right} U^2+3 g (\frac$  $k^2 U H^3+9 U H+\sqrt{3} \left( H \left( h^2 k^2+3\right) H\right) + \frac{1}{3} \left( h^2 H \left( h$  $H} \left( \frac{h^2 k^2+3 \right)}{5/2} \right) - \frac{i k^6 \left( \frac{3}{g} H+2 \right)}{1}$  $U + \frac{1}{2} \left( \frac{H^2 k^4 + 2 \left( U k^4 + 2$  $U+12 \sqrt{3} \sqrt{4^2 + 3 \cdot g} U-3+6 g H \left(H^2 k^2+3\right) U+2$  $\$  \sqrt{3} \sqrt{g H \left(H^2 k^2+3\right)} \text{dt}^4{4 \q H} \left(H^2 k^2+3\right)} \reft(H^2 k^2+3)^2 H^2 \reft(H^2  $\label{left} $$k^2+3\right)^{5/2}+O\left(\frac{dt}^5\right)\right) \cdot \left(\frac{dt}^4-\frac{dt$  $k^2+13\right)+16\left(\frac{4^2 k^2+3\right)}{k^2+3}$ 

 $U = \frac{3}{2} \left( \frac{4 \left( \frac{4^2 k^2 + 3\right)^{3/2} \right) - \frac{k^4 \left( \frac{4^2 k^2 + 3\right)^{3/2} \right)}{k^4 \left( \frac{4^2 k^2 + 3\right)^{3/2} \left( \frac{k^4 \left( \frac{4^2 k^2 + 3\right)}{k^4 \left( \frac{4^2 k^2 + 3\right)^{3/2} \right)}} \right)} }$ H^4 k^4+234 H^2 k^2+369\right) U+144 \sqrt{g H \left(H^2 k^2+3\right)\right)+4 \left(7 \sqrt{g H^9}  $\left(H^2 k^2+3\right) U^2 k^4+3 \left(H^5 \left(H^2 k^2+3\right) U^2+3 \right) U^2+3$  $\label{left(H^2 k^2+3\left| h(H^2 k^2+3\right| U^2\right) U^2\left| h(H^2 k^2+3\right| U^2\right) U^2\left| h(H^2 k^2+3\right| U^2\right| U^2\right| U^2\left| h(H^2 k^2+3\right| U^2\right| U^2\left| U^2\right| U^2\left| h(H^2 k^2+3\right| U^2\right| U^2\left| h(H^2 k^2+3\right| U^2\right| U^2\left|$  $\$  \\ \left(H^2 k^2+3\right)^{5/2}}+\\ \frac{k^5}\\ left(\\ left(H^2 k^2+3\right) U+\\ sqrt{3}\\ sqrt{g H} \left(H^2 k^2+3\right)\right) \left(g H \left(\sqrt{3} \left(49 H^4 k^4+306 H^2 k^2+477\right) U+171  $\label{eq:left} $\operatorname{H}\left(H^2 k^2+3\right)\right)^{-5} \left(B \right)^{-9} \left(H^2 k^2+3\right)^{0} U^2 k^4+3\left(16 + 16 H^2 k^2+3\right)^{-1} U^2 k^4+3\left(16 H^2 k^2+3\right)^{-1} U^2 k^4+3\left(16$  $\label{eq:continuous} $$ \left( H^2 k^2 + 3\right) U^2 + 3 \left( H^2 k^2 + 3\right) \left( H^2 k^2 + 3\right) \right) h^2 \left( H^2 k^2 + 3\right) h^2$  $\left(\frac{4t}^2 k^2+3\right) U^2\right) U^2\right) + \left(\frac{4t}^2 k^2+3\right) U^2\right) U^2\left(\frac{4t}^2 k^2+3\right) U^2\left(\frac{4t}^2 k$  $k^6 \left( \frac{A^2 + 3\right)}{U + \sqrt{16}(H^2 k^2 + 3\right)} \right) U + \left( \frac{H^2 k^2 + 3\right)}{U + \sqrt{16}(H^2 k^2 + 3\right)} \right) U + \left( \frac{H^9 k^2 + 3\right)}{U + \sqrt{16}(H^2 k^2 + 3\right)}$  $\label{eq:left(H^2 k^2+3\wedge light)} $$ U^2 k^4+6 \left( 52 \right) \left( H^5 \left( H^2 k^2+3\right) U^2+9 \right) $$ U^2+9 \left( H^5 H^2 k^2+3\right) $$ U^2+9 \left( H^2 k^2+3\right) $$ U^2+9$  $\left(H^2 k^2+3\right) \ h^2+468 \ gH \left(H^2 k^2+3\right) \ U^2+g \ h^2+3 \ h^2+468 \ h$ H^4 k^4+378 H^2 k^2+585\right) U+198 \sqrt{g H \left(H^2 k^2+3\right)\right)\right)\right) \text{dt}^3}{96}  $H \left( H^2 k^2 + 3 \right) \right) + 10^3 \left( 64 \right) + 10^3 \left( H^9 \left( H^2 k^2 + 3 \right) \right) + 10^3 \left( H^2 k^2 + 3 \right) + 10^3 \left( H^2 k^2 +$  $\$  \\sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+21 \\sqrt{g^3 H^7 \left(H^2 k^2+3\right)}\\right) k^2+576 \sqrt{g H \left(H^2 k^2+3\right)} U^2+g H \left(\sqrt{3} \left(73 H^4 k^4+450 H^2 k^2+693\right)  $U+225 \left( H \left( H^2 k^2+3\right)\right)\right) \left( H^2 k^2+3\right) \left( H$ g H \left(7 H^2 k^2+3\right)+16 \left(\sqrt{g H^5 \left(H^2 k^2+3\right)} k^2+3 \sqrt{g H \left(H^2 k^2+3\right)} k^2+3 \sqrt  $k^2+3\right)$  Uright) $384 \sqrt{g} H$  \left( $4^2 k^2+3\right)$  \right)3/2 -\frac{\left( $4^5 \$ \left(\sqrt{3} \left(19 H^4 k^4+126 H^2 k^2+207\right) U+72 \sqrt{g H \left(H^2 k^2+3\right)}\right)+16  $\label{left(sqrt{g H^9 left(H^2 k^2+3\right)} U^2 k^4+\ left(6\ sqrt{g H^5 left(H^2 k^2+3\right)}\ U^2+\ sqrt{g^3}}$  $H^7 \left(H^2 k^2+3\right) \$  $\t $$ \left( \frac{dt}{128 \left( \frac{H^2 k^2+3\right)^{5/2}\right)^{-1}}-\frac{k^6 \left( \frac{k^6 \left( \frac{1}{3} g^2 \right)^{5/2}}{12} \right)^{-1}}{k^6 \left( \frac{k^6 \left( \frac{1}{3} g^2 \right)^{5/2}}{12} \right)^{-1}} \right)^{-1}} \right)$  $\label{eq:left(H^2 k^2+3\wedge right)} $$ \left( H^2 k^2 + 3\wedge right \right) H+32 \left( Sqrt{g H^9 \left( H^2 k^2 + 3\wedge right \right) } U^3 k^4 + 2 \left( Sqrt{g H^9 \left( H^2 k^2 + 3\wedge right \right) } U^3 k^4 + 2 \left( H^2 k^2 + 3\wedge right \right) \right) $$$  $H^5 \left(H^2 k^2+3\right) U^3+2 \left(H^2 k^2+3\right) U^3+2 \left(H^2 k^2+3\right) U^2 + h^2 \left(H^2 k^$  $\label{left(H^2 k^2+3\wedge ight)} $$ U^3\right) text{dt}^2{128 \qquad H} \left(H^2 k^2+3\right)^{5/2}+\frac{h^7}{2}. $$$  $\label{left(H^2 k^2+3\left(H^2 k^2+3\right)} $$\left(H^2 k^2+3\right) \left(H^2 k^2+3\right) \left(H^$  $\left(5 \text{ H}^2 \text{ k}^2 + 21\right) \text{ H}^2 + 3 \text{ g U } \left(5 \text{ H}^2 \text{ k}^4 + 646 \text{ H}^2 \text{ k}^2 + 1011\right)$  $U+717 \left( H^2 k^2+3\right) + H+5 \left( 3^2 \right) + H^9 \left( H^2 k^2+3\right) + U^3$  $k^4+3 \left(64 \right) U^3+39 \left(64 \right) U^3+3$  $U \rightarrow k^2 + 288 \left( H \left( H^2 k^2 + 3 \right) \right) U^3 \right) \left( t^3 \right) \left( t^3$  $\label{eq:left(H^2 k^2+3\rightarrow V+3+frac} $$\left(H^2 k^2+3\right) U+\sqrt{1/2} + \frac{i k^8 \left(H^2 k^2+3\right) U+\sqrt{1/2}}{2} \right) $$$  $k^2+3\left(\frac{40}{\sinh^2 k^2+3\right)} U^3 k^4+2\left(\frac{40}{\sinh^2 k^2+3\right)} U^3 k^4+2\left(\frac{40}{h^2 k^2+3}\right) U^3 k^4$ \left(H^2 k^2+3\right)} U^3+137 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U\right) k^2+720 \sqrt{g H  $\left(H^2 k^2+3\right) U^3+5 \left(H^2 k^2+45\right) U^3+5 \left(H^2 k^2+45\right) U^3+5 \left(H^2 k^2+45\right) U^3+6 U^3+6$ H^4 k^4+930 H^2 k^2+1449\right) U+990 \sqrt{g H \left(H^2 k^2+3\right)\right)\right)\right)\text{dt}^4\{128}  $\label{eq:linear_sqrt} $$ \operatorname{H}\left(H^2 k^2+3\right)^{9/2}+O\left(\frac{dt}{5}\right)\right) \operatorname{left}(H^2 k^2+3\right)^{9/2}+O\left(\frac{dt}{5}\right) \operatorname{left}(H^2 k^2+3\right)^{9/2}+O\left(\frac{dt}{5}\right$  $\sqrt{3} g H \left(15 H^4 k^4+146 H^2 k^2+543\right) +256 \left(5 H^9 \left(4.5 H^2 k^2+3\right)\right)$  $k^4+6 \operatorname{qt}(H^2 k^2+3\operatorname{right}) k^2+9 \operatorname{qt}(H^2 k^2+3\operatorname{right}) \operatorname{dr}(H^2 k^2+3\operatorname{right})$  $\left( \frac{H}{2 k^2 + 3 \right)^{5/2}}+\frac{k^6 \left( \frac{g}{g} \right)^{5/2}}{k^6 \left( \frac{g}{g} \right)^{5/2}} \right)$ \aart(2) II IIA4 : 060 \aart(a IIA0 \la@(IIA2 laA) : 2\right\)\right\\\right\\\A : 45725 \aart(2) IIA2 II laA : 51020

| 2 ∪ π 4+300 | 2 ∪ π 4+300 | 2 ∪ π 2 ∪  $\$  \\ \quad \\ H\\left(H^2 \\ \^2+3\\ \right)\\ H(31 \\ \\ H^{13} \\ H^{13} \\ H^2 \  $k^2+3\right) U^2 k^6+279 \sqrt{H^2 k^2+3\right) U^2 k^4+27 \left(31 \right) 1$  $\left(H^2 k^2+3\right) U^2+7 \left(H^2 k^2+3\right) V^2+3\right) U^2+7 \left(H^2 k^2+3\right) V^2+3\right)$ \left(9 \sqrt{3} g^2 \left(775 H^4 k^4+6258 H^2 k^2+12999\right) H^2+g U \left(20551 \sqrt{3} H^6 U k^6+3 \left(65021 \sqrt{3} U H^4+12288 \sqrt{g H^9 \left(H^2 k^2+3\right)\right) k^4+617661 \sqrt{3} H^2 U k^2+81 \left(8053 \sqrt{3} U+5888 \sqrt{g H \left(H^2 k^2+3\right)\right)\right) H+128 \left(86  $\$  \\sqrt{g H^{13} \\left(H^2 k^2+3\right)} U^3 k^6+774 \\sqrt{g H^9 \\left(H^2 k^2+3\right)} U^3 k^4+9 H} \left( $H^2 k^2+3\right)^{7/2}\right) - \frac{i k^8 \left(U^3 \left(U^3 \right) g H^9+7776 \right)}{1}$  $H^{17} \left( H^2 k^2 + 3\right) U\right) V \left( h^8 + 3 U \right) \left( h^8 + 3 U \right$  $U+5312 \sqrt{H^2 + 13} \left( H^2 + 13 \right) \left( H^2 + 13 \right)$ U^3\right) k^6+9 \left(31231 \sqrt{3} g^2 U H^6+2 g U^2 \left(67003 \sqrt{3} U+34336 \sqrt{g H  $\label{eq:high_energy} $$\left(H^2 k^2+3\right) H^5+288 \left(162 \right) H^5 + 288 \left(162 \right) H^5 \left(162 \right) U^4+5 \left(162 \right) H^5 \left(162 \right) H^5$  $H^{13} \left(H^2 k^2+3\right)\right) \ k^4+27 \left(35319 \right) \ yrt{3} g^2 U H^4+91580 \$ g U^3 H^3+64 \left(486 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^4+1155 \sqrt{g^3 H^7 \left(H^2  $k^2+3\right) U^2+59 \left( h^2 k^2+3\right) right) right) k^2+243 \left( h^2 k^2+3\right) right)$  $\label{left} $\left(H^2 \ k^2+3\right) U^4+g \ H\left(f(7823 \right) U+8832 \right] \ U+8832 \ (H^2 \ k^2+3\right) \ U^3+g \ H\left(f(4)^2 \ k^2+3\right) \ U^3+g \ H^2 \ (H^2 \ k^2+3) \ U^3+g \ H^2 \ (H^2$  $U^2+4423 \sqrt{3} g^2 H^2 U+832 \sqrt{g^5 H^5 \left(\frac{H^2 k^2+3\right)}{\sinh(H^2 k^2+3\right)}} \left(\frac{1}{3} 30720 -\frac{1}{3} \frac{1}{3} \frac{1}$  $\$  \\sqrt{g H} \\left(H^2 k^2+3\right)^{9/2}}+\\frac{k^9} \\left(\\left(H^2 k^2+3\right) U+\\sqrt{3} \\sqrt{g H}  $\left(H^2 k^2+3\right)\right)\right) \left(H^2 k^2+3\right) \left(H^2 k^2+$ k^2+3\right) U\right) k^8+3 U \left(45573 \sqrt{3} g^2 H^8+g U \left(456644 \sqrt{3} U+108089 \sqrt{g H \left(H^2 k^2+3\right)\right) H^7+169472 \sqrt{g H^{13} \left(H^2 k^2+3\right)} U^3\right)  $k^6+9 \left(153703 \right)$   $47651 \right)$  $k^2+3\left( \frac{H^2}{k^2+3}\right) + h^5+254208 \left( \frac{H^2}{k^2+3}\right) + h$ k^2+3\right)\right) k^4+27 \left(172047 \sqrt{3} g^2 U H^4+477940 \sqrt{3} g U^3 H^3+169472  $\$  \\sqrt{g H^5 \left(H^2 k^2+3\right)} U^4+372075 \\sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^2+18078  $\$  \\ sqrt{g^5 H^9 \\ left(H^2 k^2+3\\ right)\\ right) \\ k^2+81 \\ left(42368 \\ sqrt{g H \\ left(H^2 k^2+3\\ right)\\ U^4+g H \left(122207 \sqrt{3} U+132513 \sqrt{g H \left(H^2 k^2+3\right)\right) U^2+63917 \sqrt{3} g^2 H^2  $U+11603 \left( \frac{41}{92160} \right) \left( \frac{4}{92160} \right) \left$  $\left( H^2 U k^3 + 3 U k - \sqrt{3} \right) \left( H^2 U k - \sqrt{3}$  $k^2+3\right)^2-\frac{h^2}{h^2}-\frac{h^2}$  $k^2+3\right) \left( 4 + U \left( 4 + U \right) \right) -2 \left( 4 + U \right) \left( 4 + U \right)$  $k^2+3\right) \right) \cdot (h^2 k^2+3\right) \cdot (h^2 k^2+3) \cdot (h^2 k^2+3$  $k^2+3\right\} \left( U-\sqrt{3} \right) \left( U-\sqrt{$  $U^2+3 g H \left( \frac{h^2 k^2+3\right)}{U-\sqrt{3} \left( \frac{h^2 k^2+3\right)} \left( \frac{h^2 k^2+$  $\label{left} $$ \operatorname{dt}^3_{4 \left( h^2 k^2 + 3\right)^3} + \frac{k^5 \left( h^2 k^2 + 3\right) U - \frac{3} \left( h^2 k^2 + 3\right) U - \frac{3} \left( h^2 k^2 + 3\right) U - \frac{3}{4} \right) U - \frac{3}{4} \left( h^2 k^2 + 3\right) U - \frac{3}{4} \left( h^2 k$  $\label{left(H^2 k^2+3\wedge left(H^4 U k^4+\left(6 H^2 U-4 \right))} $$\left(H^5 \left(H^2 U-4 \right)\right) \left(H^5 \left(H^2 U-4 \right)\right) $$$  $k^2+3\right)$  ( $k^2+9$  U-12 \sqrt{3} \sqrt{g H \left(H^2 k^2+3\right)} \right) \U^3+6 g H \left(H^2 \left(H^2 L^2+3\right)) \right \U^3+6 g H \left(H^2 L^2+3\right) \right) \right \U^3+6 g H \left(H^2 L^2+3\right) \right \U^3+6 g H \left(H^2 L^2+3\right) \right) \right \U^3+6 g H \left(H^2 L^2+3\right) \right\U^3+6 g H \left(H^2 L^2+3\right) \right \U^3+6 g H \left(H^2 k^2+3\right) U-2 \sart{3} \sart{g H \left(H^2 k^2+3\right)\right) U+9 g^2 H^2\right) \text{dt}^4\forall 5

 $\left(H^2 k^2+3\right)^3+O\left(\frac{dt}^5\right)\right)+\left(\frac{1}{4} i k^2 \left(\frac{3} \sqrt{3} \right)\right)$  $\label{left} $$k^2+3\right) \left( \frac{3}{g} H-2 \right) H-2 \left( \frac{H^2 k^2+3\right) U\right) U\right) \left( \frac{3}{g} H-2 \right) H-2 \left( \frac{H^2 k^2+3\right) U\right) U\right) \left( \frac{1}{g} H-2 \right) H-2 \left( \frac{1}{g} H k^2+3\right) U-2 \left( H^2 + 1 \right) \left( H^2 + 1 \right) \left( H^2 + 1 \right) U-2 \left( H^2$  $k^2+3\right) \right) \left( H^2 k^2+3\right) \left( H^2$  $H-2 \left( H^2 \left( H^2 + 1 \right) \right) \left( H^2 + 1 \right)$ k^2+3\right)}-2 H^2 U\right) k^2+9 U-9 \sqrt{3} \sqrt{g H \left(H^2 k^2+3\right)}\right) U^2+3 g H  $\left(\frac{3 \left(\frac{4^2 + 3\right)}{10^2 + 3\right)} \left(\frac{4^2 + 3\right)}{10^2 + 3\right)} \left(\frac{4^2 + 3\right)}{10^2 + 3\right)}$  $\label{left(H^2 k^2+3)right)^{5/2}} + \frac{i k^6 \left( \sqrt{3} g H - 2 \right) + \frac{1}{2} \left( \frac{4}{2} k^2 + 3 \right)}{k^6 \left( \frac{4}{2} k^2 + 3 \right) + \frac{1}{2} \left( \frac{4}{2} k^2 + 3 \right)$  $U = U + \frac{1}{2} \left( H^2 U^4 - \frac{1}{2} \right) \left( H^2 U^4 - \frac{1}{2} \right)$  $\left(\frac{4x}{2}\right)^{5/2}+O\left(\frac{dt}{5}\right) \cdot \left(\frac{4x}{4x}+\left(\frac{4x}{5}\right)\right) \cdot \left(\frac{4x}{4x}+\frac{4x}{5}\right)$  $H \left(3 + 2 k^2 + 1\right) - 16 \left(\frac{4 + 2 k^2 + 3 \right) U k^2 + 3 \left(\frac{4 k^2 + 3 \right) U k^2 + 3 \left(\frac{4 k^2 + 3 \right)}{U k^2 + 3 \left$  $k^2+3\right) U\right) U\right) \{96 \right) \{97 + 3\right) \{97 + 3\right\}$  $\left(37 \text{ H}^4 \text{ k}^4+234 \text{ H}^2 \text{ k}^2+369\right) \text{ U}-144 \right) \text{ H}\left(\frac{1}{2} \text{ k}^2+3\right) \left(\frac{1}{2} \text{ H}\right) \left(\frac{1}{2} \text{ k}^2+3\right) \left(\frac{1}{2} \text{ H}\right) \left(\frac{1}{2} \text{ k}^2+3\right) \left(\frac{1}{2} \text{ H}\right) \left(\frac{1$  $\$  \\sqrt{g H^9 \left(H^2 k^2+3\right)} U^2 k^4+3 \left(14 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+3  $\left(\frac{g^3 H^7 \left(H^2 k^2+3\right)}\right) k^2+63 \right) k^2+63$  $\label{eq:left(h^2 k^2+3\wedge fight)^{5/2}}-\frac{\left(k^5 \left(k^5 \right) + f(k^2 k^2+3\right)}{5/2}}-\frac{1}{2}$  $\label{eq:k-2+3-right} $$ k^2+3\right)-\left(H^2 k^2+3\right)+\left(H^2 k^2+3\right)-\left(H^2 k^2+3\right)+H^2 k^2+3\left(H^2 k^2+3\right)-\left(H^2 k^2+3\right)-H^2 k^2+3\left(H^2 k^2+3\right)-H^2 k^2+3$ \left(49 H^4 k^4+306 H^2 k^2+477\right) U\right)+5 \left(8 \sqrt{g H^9 \left(H^2 k^2+3\right)} U^2  $k^4+3 \left(16 \right) H^5 \left(16 \right) U^2+3 U^2 U^2+3 U^2 U^2+3 U^$  $k^2 + 72 \left( H \left( H^2 k^2 + 3\right) \right) U^2\right) \left( H^2 k^2 + 3\right)$  $\label{left(H^2 k^2+3\wedge ight)^{7/2}\wedge ight)} + \frac{k^6 \left(\sqrt{3} \sqrt{3} \right) + \frac{k^2 + 3 \cdot ight} - \left(\frac{k^6 \left(\sqrt{3} \right)}{3} \right) + \frac{k^2 + 3 \cdot ight} - \frac{k^2 + 3 \cdot ight}{3} + \frac{k^2 + 3 \cdot ight}{3} +$  $k^2+3\right) U\right) U\right) U + (52 \left( \frac{4+6}{52 \cdot 9} \right) U + (52 \cdot 9) U + (52 \cdot$  $\left(H^2 k^2+3\right) U^2+9 \left(g^3 H^7 \left(H^2 k^2+3\right)\right) k^2+468 \left(g^4 H^2 H^2 k^2+3\right)$  $\label{left} $$k^2+3\right) U^2+g \ H \left(198 \right)^2 + \left(198 \right)^3 \left(198 \right$  $H^2 k^2 + 58 \right) U \right) \left( \frac{d^3}{g^2} + \frac{d^2 k^2 + 3 \right) \left( \frac{4k^2 + 3 \right) \left( \frac{k^2 + 3 \right) \left( \frac$  $\left(\frac{3} \right) \left(\frac{4 \operatorname{ft}(H^2 k^2+3\right)}{-\left(\frac{4 \operatorname{ft}(H^2 k^2+3\right)}{-\left(\frac{4$  $H^9 \left(H^2 k^2+3\right) U^2 k^4+3 \left(H^5 \left(H^2 k^2+3\right) U^2+21\right)$  $\left(\frac{g^3 H^7 \left(\frac{h^2 k^2+3\right)}}{y^2+3}\right) k^2+576 \left(\frac{g^3 H^7 \left(\frac{h^2 k^2+3\right)}}{y^2+3}\right) U^2+g^2}$  $H \left(225 \right) + \left(4^2 k^2 + 3\right) - \left(4^3 k^2 + 3\right) - \left(4^3 k^2 + 450 k^2 + 693\right) + \left(4^3 k^2 + 450$  $U\left(\frac{dt}^4}{96 \right) \left(\frac{H^2 k^2+3\left(\frac{dt}^4}{96 \right)}{1/2}\right)} + O\left(\frac{dt}^4}{96 \right) \left(\frac{H^2 k^2+3\left(\frac{dt}^4\right)}{96 \right)}{1/2}} + O\left(\frac{dt}^4}{96 \right) \left(\frac{H^2 k^2+3\left(\frac{dt}^4\right)}{96 \right)}{1/2}} + O\left(\frac{dt}^4}{96 \right) \left(\frac{H^2 k^2+3\left(\frac{dt}^4\right)}{96 \right)}{1/2}} + O\left(\frac{dt}^4}{96 \right) \left(\frac{dt}^4}{96 \right)} + O\left(\frac{dt}^4}{96 \right)} + O\left(\frac{dt}^4}{96 \right) \left(\frac{dt}^4}{96 \right)} + O\left(\frac{dt}^4}{96 \right)} + O\left(\frac{dt}{96 \right$  $k^2+3\right) \ U-\sqrt{3} g H \left( 7 H^2 k^2+3\right) \ (384 \ \ H) \ (4^2 h^2) \ (4^2 h^2)$  $\left( \frac{H^2 k^2+3\right)}{16} \left( \frac{H^2 k^2+3\right)} \right) \$  $\$  \sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+\sqrt{g^3 H^7 \left(H^2 k^2+3\right)}\right) k^2+9 \sqrt{g H}  $\label{left(H^2 k^2+3\circ h) U^2\circ h} $$\left(H^2 k^2+3\right) U^2\right)^{5/2}+\frac{dt}{128 \cdot gH} \left(H^2 k^2+3\right)^{5/2}+\frac{dt}{128 \cdot gH} \right)^{5/2}+\frac{dt}{128 \cdot gH} \left(H^2 k^2+3\right)^{5/2}+\frac{dt}{128 \cdot g$  $k^6 \left( \frac{9 \right) }{2 \left( 3 \right) } g^2 \left( 3 \right) H^2 k^2 + 13\right) H^2 + 5 g U \left( \frac{3 \right) H^2 k^4 + 82 g U \right) H^2 + 13 H^2 U H^2 U$  $k^2+3\right) U^3 k^4+2\left(3 \right) U^3 +2 \left(1 - 2 k^2+3\right) U^3+2 \right) U^3+2 \left(1 - 2 k^2+3\right) U^3+2 \left(1 - 2 k^2+3\right) U^3+2 U^3+2$ 

 $k^2+3\right) U\rightarrow k^2+9 \left( H^2 k^2+3\right) U^3\right) \left( L^3\right) \left( L^3\right$  $\left(H^2 k^2+3\right)\right)$ \left(103 H^4 k^4+646 H^2 k^2+1011\right) U-717 \sqrt{g H \left(H^2 k^2+3\right)\right) H-5  $\left(32 \right) H^9 \left(H^2 k^2+3\right) U^3 k^4+3 \left(4 \right) H^5 \left(H^2 k^2+3\right)$  $U^3+39 \operatorname{sqrt}\{g^3 H^7 \operatorname{left}(H^2 k^2+3\operatorname{right})\} U\operatorname{right}(k^2+288 \operatorname{sqrt}\{g H \operatorname{left}(H^2 k^2+3\operatorname{right})\})$  $U^3\right) \left( \frac{4}{3}{384 \left( \frac{H^2 k^2+3\right)}{(1-4)^2 k^2+3\right)} - \frac{1}{3}{384 \left( \frac{H^2 k^2+3\right)}{(1-4)^2 k^2+3\right)} - \frac{1}{3}{384 \left( \frac{H^2 k^2+3\right)}{(1-4)^2 k^2+3\right)} - \frac{1}{3}{384 \left( \frac{H^2 k^2+3}{(1-4)^2 k^2+3\right)} - \frac{1}{3}{$  $k^8 \left( \frac{4^2 + 3\right)}{\left( \frac{4^2 + 3^2 + 3\right)}{\left( \frac{4^2 + 3^2 + 3^2}{\left( \frac{4^2 + 3$ g^2 \left(11 H^2 k^2+45\right) H^2+g U \left(\sqrt{3} \left(149 H^4 k^4+930 H^2 k^2+1449\right)  $U-990 \left( H^2 k^2+3\right) H-2 \left( 40 \right) H-2 \left( 4$  $k^4 + \left\{ \frac{40 \left( H^2 k^2 + 3\right)}{U^3 + 137 \left( H^2 k^2 + 3\right)} \right\} U^3 + 137 \left( H^2 k^2 + 3\right)$  $U + \frac{k^2 + 360 \operatorname{kg} H \operatorname{left}(H^2 k^2 + 3\operatorname{left}(H^2 k^2 + 3\operatorname{lef$  $\label{left(xyyyy} $$ k^2+3\right)^{9/2}+O\left(\frac{dt}^5\right)\right) \text{ } text{dx}^3+\left(\frac{k^5 \left(\frac{56 \left(\frac{45}{5}\right)}{160}\right)}{160}\right) $$$  $H^9 \left( H^2 k^2 + 3 \right) k^4 + 6 \left( H^2 k^2 + 3 \right) k^2 + 9 \left( H^2 k^2 +$  $k^2+3\left(15 H^4 k^4+146 H^2 k^2+543\left(16 H^3 k^4+146 H^2 k^2+543\left(16 H^3 k^4+146 H^2 k^4+146 H^2 k^4+146 H^3 k^4+1$  $\left(H^2 k^2+3\right)^{5/2}+\frac{i k^6 \left(128 \left(131 \right) + H^2 k^2+3\right)}{U^2}$  $k^6+279 \cdot H^5 \cdot H^2 \cdot H^3 \cdot$  $U^2+7 \left( \frac{4^2 + 1}{4^2 + 1} \right) \left( \frac{4^2 + 3}{4^2 + 1} \right) \left( \frac{4^2 +$  $U^2\right] = U^2\right] = U^2_1 = U^2_$ k^2+3\right)\right) k^4+45735 \sqrt{3} H^2 U k^2+51039 \sqrt{3} U-18432 \sqrt{g H \left(H^2 \sqrt{3} g^2 \left(775 H^4 k^4+6258 H^2 k^2+12999\right) H^2+g U \left(20551 \sqrt{3} H^6 U k^6-3 \left(12288 \sqrt{g H^9 \left(H^2 k^2+3\right)}-65021 \sqrt{3} H^4 U\right) k^4+617661 \sqrt{3} H^2  $\sqrt{g H^{13} \left( \frac{h^2 k^2+3\right)} U^3 k^6+774 \left( \frac{h^2 k^2+3\right) U^3 k^4+9} \right)}$  $\left(258 \right) \left(4^2 \right) \left$  $k^2+3\right/f(H^2 k^2+3\right)$ \sqrt{3} g H^9\right) k^8-3 U \left(9181 \sqrt{3} g^2 H^8+4 g U \left(21787 \sqrt{3} U-5312 \sqrt{g}  $H \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2 + 3 \right) }{h^7 - 31104 \operatorname{sqrt} \{g H^{13} \left( \frac{h^2 k^2$ \left(-31231 \sqrt{3} g^2 U H^6+2 g U^2 \left(34336 \sqrt{g H \left(H^2 k^2+3\right)}-67003 \sqrt{3}  $U + \frac{1}{3} \left( \frac{4}{3} \right) U + \frac{4}{3} \left( \frac{62 \left( \frac{62 \left( \frac{4}{3} \right)}{13} \right) U^4 + \frac{6}{3} \left( \frac{6}{3} \right) U^4 + \frac{6}{3} \left( \frac{6}{3} \right) U^4 + \frac{6}{3} \left( \frac{6}{3} \right) U + \frac{6}{3}$  $k^2+3\right) \left( \frac{3}{g} U^3 H^3+64 \right)$  $\label{left} $$\left(486 \right \P^5 \left(4^2 k^2 + 3\right) U^4 + 1155 \right] U^4 + 1155 \right] U^5 H^7 \left(4^2 k^2 + 3\right) U^2 + 59 H^7 \left(4^2 k^2 + 3\right) U^5 H^7 \left(4^2 k^2 + 3\right) U^7 \left(4^2 k^2 + 3\right)$  $\left(\frac{6^5 H^9 \left(\frac{4^2 k^2+3\right)}\right)}{k^2+243 \left(\frac{592 \sqrt{9} k^2+3 k^2+3\right)}}\right)$  $U^4+g H \left(8832 \right) + U^2 + U^4+g H \left(8832 \right) + U^2 - 4423 \right)$  $H^2 U + 832 \sqrt{g^5 H^5 \left(\frac{H^2 k^2 + 3\right)}\right) \left(\frac{dt}{3}{30720 \sqrt{g H}} \right) \left(\frac{H^2 k^2 + 3\right)}{16} H^2 U + 832 \sqrt{g H} \left(\frac{H^2 k^2 + 3\right)} \right) \left(\frac{H^2 U + 832 \sqrt{g H}}{16} \right) \left(\frac{H^2 U + 832 \sqrt{$  $k^2+3\right)^{9/2}-\frac{h^2 k^2+3\left(h^2 k^2+3\right)^{-1}}{k^2+3\left(h^2 k^2+3\right)^{-1}}-\frac{h^2 k^2+3\left(h^2 k^2+3\right)^{-1}}{k^2+3\left(h^2 k^2+3\right)^{-1}}$  $U = U \cdot (42368 \cdot (4$ k^8-3 U \left(45573 \sqrt{3} g^2 H^8+g U \left(456644 \sqrt{3} U-108089 \sqrt{g H \left(H^2  $k^2+3\right) \ U^3\right) \ h^7-169472 \ (H^{13} \ h^{13} \ h^2 + 3\right) \ U^3\right) \ h^6+9 \ h^{13} \ h^6+9 \ h^6+9$  $\sqrt{3} g^2 U H^6+g U^2 \left(47651 \right) + \left(4^2 k^2+3\right) -700818 \right)$  $H^5 + 254208 \left( H^2 k^2 + 3\right) U^4 + 7035 \left( H^2 k^2 + 3\right) \left( H^2 k^2 + 3$   $k^4+27 \left(172047 \right) g^2 U H^4-477940 \right] g U^3 H^3+169472 \left(172047 \right) k^4+27 \left(172047 \right) g U^3 H^3+169472 \right)$  $k^2+3$ right)}  $U^4+372075 \sqrt{g^3 H^7 \left(\frac{h^2 k^2+3}{g^5 H^9}\right)} U^2+18078 \sqrt{g^5 H^9 \left(\frac{h^2 k^2+3}{g^5 H^9}\right)}$  $k^2+3\right) \ k^2+3 \ k^$  $\ \left( H \left( H^2 k^2 + 3\right) - 122207 \right) U^2 - 63917 \right) g^2 H^2 U + 11603$  $\$  \sqrt{g^5 H^5 \left(H^2 k^2+3\right)\right)\right) \text{dt}^4\{92160 \left(\sqrt{g H} \left(H^2 k^2+3\right)\right)\right)} 

Out[197]=

$$\begin{aligned} & \text{Out} \text{[198]=} \quad \text{EA} \ \| \quad \left\{ \left\{ 1 + \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, \text{H}^2 \, k^3 \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{(6 + 2 \, \text{H}^2 \, k^2) \, \text{w}}, \, \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, \text{H} \, k \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{2 \left( \text{H} + \frac{\text{H}^3 \, k^2}{3} \right) \, \text{w}} \right\}, \\ & \quad \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \left( g \, \text{H} \, \left( 3 + \text{H}^2 \, k^2 \right) - 3 \, \text{U}^2 \right) \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{2} \right\}, \, \\ & \quad \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, w} \right) \, k \left( 6 + \text{H}^2 \, k^2 \right) \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{2} \right\} \right\} \end{aligned}$$

Out[199]= **EA** || \left(

\begin{array}{cc}

 $\frac{i e^{\frac{1}{2}} \left(1-e^{-i \text{text}dx} k\right) \left(1-e^{i \cdot text}dx\right) \left(1$ w\right) H^2 U \csc \left(\frac{\text{dx} k}{2}\right) k^3}{\left(2 H^2 k^2+6\right) w}+1 &  $\frac{i e^{\frac{i -e^{i \cdot k}}{dx} k}}{2}} \left(1-e^{-i \cdot k}\right) \left$ w\right)  $H k \csc \left(\frac{dx}{k}{2}\right)$   $\left(\frac{k^2 H^3}{3} + H\right)$   $\left(\frac{dx}{k}{2}\right)$ 

 $\left(\frac{4x}{k}^2 + 3\right) - U^2\right) \cos \left(\frac{4x}{k}^2 + 3\right) - U^2\right) - U^2\right)$  $w\} \& \frac{i e^{\frac{i \cdot k}{2}} \left(1-e^{-i \cdot k} k\right) \left(1-e^{i \cdot k} k\right) \left$  $k \left( H^2 k^2 + 6 \right) U \left( H^2 k^2 + 6 \right) U \left( H^2 k^2 + 6 \right) W + 1$ 

\end{array}

\right)

$$\begin{aligned} & \text{Eerr ||} \\ & & \left\{ \left\{ \left( -\frac{\left( H^2 \, k^3 \, U \, w \right) \, dt^2}{2 \, (3 + H^2 \, k^2)} - \frac{i \, H^2 \, k^3 \, U \, w^2 \, dt^3}{6 \, (3 + H^2 \, k^2)} + \frac{H^2 \, k^3 \, U \, w^3 \, dt^4}{24 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) + \left( -\frac{1}{2} \left( k^2 \, U \right) \, dt + O[dt]^5 \right) \, dx + \left( \frac{i \, (9 \, H^2 \, k^5 + 2 \, H^4 \, k^7) \, U \, dt}{12 \, (3 + H^2 \, k^2)^2} + O[dt]^5 \right) \\ & dx^2 + \left( \frac{1}{24} \, k^4 \, U \, dt + O[dt]^5 \right) \, dx^3 + \left( -\frac{i \, (54 \, H^2 \, k^7 + 19 \, H^4 \, k^9 + 2 \, H^6 \, k^{11}) \, U \, dt}{240 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) \, dx^4 + O[dt]^5, \\ & \left( -\frac{3 \, (k \, w) \, dt^2}{2 \, (3 + H^2 \, k^2)} - \frac{i \, k \, w^3 \, dt^4}{8 \, (3 + H^2 \, k^2)} + \frac{k \, w^3 \, dt^4}{8 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) + \left( \frac{i \, (6 \, k^3 \, H^2 \, k^2)}{4 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) \, dx^2 + \left( \frac{i \, (-54 \, k^5 \, H^4 \, k^9) \, dt}{24 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) \, dx^4 + O[dt]^5 \right) \\ & + O[dx]^5 \right\}, \\ & \left( -\frac{k \, (3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2) \, w) \, dt^2}{2 \, (3 + H^2 \, k^2)} - \frac{i \, k \, (3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2) \, w^2 \, dt^3}{6 \, (3 + H^2 \, k^2)} + \frac{k \, (3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2) \, w^3 \, dt^4}{24 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) \, dx^4 + O[dt]^5 \right) + \\ & \left( -\frac{1}{2} \left( g \, H \, k^2 \right) \, dt + O[dt]^5 \right) \, dx + \left( \frac{i \, (18 \, g \, H \, k^3 + 12 \, g \, H^3 \, k^3 + 2 \, g \, H^3 \, k^7 - 18 \, k^3 \, U^2 - 3 \, H^2 \, k^3 \, U^2 \right) \, dt}{12 \, (3 + H^2 \, k^2)^2} + O[dt]^5 \right) \, dx^2 + \\ & \left( \frac{1}{24} \, g \, H \, k^4 \, dt + O[dt]^5 \right) \, dx^3 + \left( -\frac{i \, (54 \, g \, H \, k^5 + 54 \, g \, H^3 \, k^7 + 18 \, g \, H^5 \, k^9 + 2 \, g \, H^7 \, k^{11} - 54 \, k^5 \, U^2 + H^4 \, k^9 \, U^2 \right) \, dt}{240 \, (3 + H^2 \, k^2)^3} + O[dt]^5 \right) \, dx^4 + O[dt]^5 \right) \, dx^$$

```
Out[201]= Eerr || \left(
                                                                    \begin{array}{cc}
                                                                         \left(-\frac{h^2 k^3 U \text{ whight}}{2}}{2 \left(\frac{h^2 k^2+3\right)}-\frac{i}{2}}\right)
                                                                                                                         H^2 k^3 U w^2 \text{text} dt^3 {6 \left(H^2 k^2 + 3\right)} + \frac{H^2 k^3 U w^3 \text{text} dt^4}{24}
                                                                                                                         \left(H^2 k^2+3\right)+O\left(\left(text{dt}^5\right)+\left(text{dt}^5\right)\right)+\left(text{dt}^2 U\right)
                                                                                                                         \text{dt}+O\left(\text{dt}}^5\right)\right)\text{dx}+\left(\frac{i \left(2 H^4 k^7+9 H^2 k^5\right) U
                                                                                                                         \label{eq:local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_
                                                                                                                         \label{eq:linear_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_con
                                                                                                                         k^9+54 H^2 k^7 \in U \left(\frac{dt}{240 \left(H^2 k^2+3\right)^3}+O\left(\frac{dt}{5\right)^5\right)\right)
                                                                                                                         \text{dx}^4+O\left(\frac{dx}^5\right) & \left(-\frac{3 (k w) \text{d}^2}{2 \left(\frac{H^2}{2}\right)} \right)
                                                                                                                         \label{left} $$ k^2+3\right)-\frac{k^2}{2 \left( k^2+3\right)}-\frac{k^2}{2 \left( k^2+3\right)}+\frac{k^2}{2 \left( k^2+3\right)}+\frac{k^
                                                                                                                         \label{left(H^2 k^5+6 k^3 right)} + O\left(\frac{dt}{5}\right) + \left(\frac{dt}{5}\right) + \left(\frac{dt}{5}\right)
                                                                                                                         k^2+3\right)^2+O\left(\frac{t}{5\right)}\right)
                                                                                                                         \label{eq:linear_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_continuous_con
                                                                         \label{left} $\left(-\frac{k^2 H^3+3 g H-3 U^2\right) \left(-\frac{1}{2}\left(\frac{k^2 H^3+3 g H-3 U^2\right) \left(\frac{1}{2}\left(\frac{h^2 k^2+3\right)}-\frac{1}{2}\left(\frac{h^2 k^2+3\right)}-\frac{1}{2}\left(\frac{h^2 k^2+3\right)}\right)}\right) dt
                                                                                                                          U^2\right\} w^3 \text{$t$ (-\frac{1}{2} \left(\frac{1}{2} \left(\frac{1}{2} \right)^4\right)^2 \right]} + O\left(\frac{1}{2} \left(\frac{1}{2} \left(\frac{1}{2} \right)^5\right)^2 \right) 
                                                                                                                         k^2\right) \text{ (frac[i \cdot fdt]+O \cdot fdt)} 
                                                                                                                          U^2 k^5 - 18 U^2 k^3 + 18 g H k^3 + 18 g 
                                                                                                                         \label{eq:lambda} $$ \operatorname{dt}^2-\left(\frac{1}{24} g \ H \ k^4 \ text{dt}+O\left(\frac{dt}{r}\right)^5\right) \right) \ text{dx}^3+\left(\frac{dt}{r}\right)^3-\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)^3+\left(\frac{dt}{r}\right)
                                                                                                                        \left(2 g H^7 k^{11}+18 g H^5 k^9+H^4 U^2 k^9+54 g H^3 k^7-54 U^2 k^5+54 g H k^5\right)
                                                                                                                         \label{left} $$ \operatorname{dt}_{240 \left(H^2 k^2+3\right)^3}+O\left(\frac{dt}^5\right)\right) \operatorname{dt}_{14}. $$ \operatorname{dt}_{240 \left(H^2 k^2+3\right)^3}+O\left(\frac{dt}^5\right)\right) \operatorname{dt}_{14}. $$
                                                                                                                         & \left(\frac{h^2 k^2+6\right) U \cdot \left(\frac{dt}^2}{2 \left(\frac{h^2 k^2+6\right) U \cdot \left(\frac{dt}^2}{2 \left(\frac{dt}^2\right)}\right)}\right)
                                                                                                                          k \left( H^2 k^2 + \frac{1}{2} \right) + \frac{1}{2} \left( H^2 k^2 + \frac{1}{2} \right) + \frac{1}{2} \left( H^2 k^2 + \frac{1}{2} \right) + \frac{1}{2} \left( H^2 k^2 + \frac{1}{2} \right) 
                                                                                                                         \label{eq:continuity} U w^3 \text{$$ \det(dt)^4}{24 \left(\frac{h^2 k^2+3\right)}+O\left(\frac{dt}{5}\right)}+O\left(\frac{dt}{5}\right)} + O\left(\frac{h^2 k^2+3\right)}{24 \left(\frac{h^2 k^2+3}{5}\right)} + O\left(\frac{h^2 k^2+3}{5}\right) + O\left(\frac{h^2 k^2+3}{5}\right)
                                                                                                                        \label{left} $$\left(k^2 U\right) \operatorname{text}(dt)+O\left(\frac{dt}^5\right)\right) \operatorname{text}(dx)+\left(\frac{dx}+\frac{dx}{dx}\right)=0.
                                                                                                                         H^2 k^5+36 k^3\right) U \text{dt}\{12 \left(H^2 k^2+3\right)^2\}+O\left(\text{dt}\^5\right)\right)
                                                                                                                         \label{eq:local_text} $$ \operatorname{dx}^2+\left(\frac{1}{24} k^4 U \right)-\operatorname{dt}+O\left(\frac{dt}{5}\right)\right)\right) \cdot \left(\frac{dt}{5}\right) \cdot 
                                                                                                                         \left(2 H^6 k^{11}+17 H^4 k^9+54 H^2 k^7+108 k^5\right) U \text{dt}}{240 \left(H^2
                                                                                                                         k^2+3\right) + O\left(text{dt}^5\right) \cdot text{dx}^4+O\left(text{dx}^5\right) \cdot text{dx}^6
                                                                      \end{array}
                                                                    \right)
        \ln[202] = \text{KurF} = (\text{fm} * \text{ap} - \text{fp} * \text{am} + \text{am} * \text{ap} * (\text{qp} - \text{qm})) / (\text{ap} - \text{am});
                                                                    KurFWS = KurF /. ap \rightarrow 0 /. am \rightarrow (U - Sqrt[g * H]);
                                                                    KurFWSeta =
                                                                                               KurFWS /. fp \rightarrow (H * v + U * Rpp * n) /. fm \rightarrow (H * v + U * Rmp * n) /. qp \rightarrow Rpp * n /.
                                                                                                               qm \rightarrow Rmp * n;
                                                                    KurFWSeta = KurFWSeta / . v \rightarrow (GGp * G + Gnp * n);
                                                                    Kfnnp = FullSimplify[KurFWSeta /. G \rightarrow 0 /. n \rightarrow 1];
                                                                    KfnGp = FullSimplify[KurFWSeta /. n \rightarrow 0 /. G \rightarrow 1];
                                                                    \texttt{Kfnn} \; = \; \texttt{Kfnnp} \; / \; . \; \; \texttt{Rpp} \; \rightarrow \; \texttt{Rp} \; \; / \; . \; \; \; \texttt{Rmp} \; \rightarrow \; \texttt{Rm} \; \; / \; . \; \; \; \; \texttt{GGp} \; \rightarrow \; \texttt{GG2} \; \; / \; . \; \; \; \; \texttt{Gnp} \; \rightarrow \; \texttt{Gn2} \; ;
                                                                    KfnG = KfnGp / . Rpp → Rp / . Rmp → Rm / . GGp → GG2 / . Gnp → Gn2;
```

```
Fnn2 = -dt * (1 - Exp[-I * k * dx]) / dx * Kfnn;
Fnn2TA = Series[Fnn2 - FnnA, {dx, 0, 3}, {dt, 0, 3}];
Fnn2TAr = Refine[Fnn2TA, \{k > 0, U > 0, H > 0, g > 0\}];
FnG2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfnG;
FnG2TA = Series[FnG2 - FnGA, {dx, 0, 3}, {dt, 0, 3}];
FnG2TAr = Refine[FnG2TA, \{k > 0, U > 0, H > 0, g > 0\}];
\texttt{KurFWSG} = \texttt{KurFWS} \ / . \ \texttt{fp} \ \rightarrow \ (\texttt{U} * \texttt{Rpp} * \texttt{G} \ + \ \texttt{U} * \texttt{H} * \texttt{v} \ + \ \texttt{g} * \texttt{H} * \texttt{Rpp} * \texttt{n}) \ / .
       \texttt{fm} \rightarrow (\texttt{U} * \texttt{Rmp} * \texttt{G} + \texttt{U} * \texttt{H} * \texttt{v} + \texttt{g} * \texttt{H} * \texttt{Rmp} * \texttt{n}) \ /. \ \texttt{qp} \rightarrow \texttt{Rpp} * \texttt{G} \ /. \ \texttt{qm} \rightarrow \texttt{Rmp} * \texttt{G};
KurFWSG = KurFWSG / . v \rightarrow (GGp * G + Gnp * n);
KfGn = KfGnp / . Rpp → Rp / . Rmp → Rm / . GGp → GG2 / . Gnp → Gn2;
KfGG = KfGGp / . Rpp \rightarrow Rp / . Rmp \rightarrow Rm / . GGp \rightarrow GG2 / . Gnp \rightarrow Gn2;
FGn2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfGn;
FGn2TA = Series[FGn2 - FGnA, {dx, 0, 3}, {dt, 0, 3}];
FGn2TAr = Refine[FGn2TA, \{k > 0, U > 0, H > 0, g > 0\}];
fGG2 = U * H * GG2 + U / 2 * (Rm + Rp) - (Sqrt[g*H]) / (2) * (Rp - Rm);
FGG2 = -dt * (1 - Exp[-I * k * dx]) / dx * KfGG;
FGG2TA = Series[FGG2 - FGGA, {dx, 0, 4}, {dt, 0, 3}];
FGG2TAr = Refine[FGG2TA, \{k > 0, U > 0, H > 0, g > 0\}];
Fmat2 = {{Fnn2, FnG2}, {FGn2, FGG2}};
Emat2 = IdentityMatrix[2] + Fmat2;
Eerr = Series[Emat2 - EA, {dx, 0, 4}, {dt, 0, 4}];
EigvFmat2 = Eigenvalues[Fmat2];
RKStep = Log[1 + EigvFmat2] / (I * dt);
RKstepTay = Series[RKStep, {dx, 0, 4}, {dt, 0, 4}];
RKstepTayr = Simplify[-RKstepTay - \{wAp, wAm\}, \{k > 0, H > 0, g > 0, U > 0\}];
Text[Row[{" U < -Sqrt(gH)"}]]</pre>
Text[" "]
Text[Row[{"Fnn || ", Kfnnp}]]
Text[Row[{"Fnn || ", TeXForm[Kfnnp]}]]
Text[Row[{"Fnn error || ", Fnn2TAr}]]
Text[Row[{"Fnn error || ", TeXForm[Fnn2TAr]}]]
Text[" "]
Text[Row[{"FnG || ", KfnGp}]]
Text[Row[{"FnG || ", TeXForm[KfnGp]}]]
Text[Row[{"FnG error || ", FnG2TAr}]]
Text[Row[{"FnG error || ", TeXForm[FnG2TAr]}]]
```

```
Text[" "]
                                                                         Text[Row[{"FGn || ", KfGnp}]]
                                                                        Text[Row[{"FGn ||
                                                                                                                                                                                                                                                                                                                                              ", TeXForm[KfGnp]}]]
                                                                         Text[Row[{"FGn error ||
                                                                                                                                                                                                                                                                                                                                                                                                                             ", FGn2TAr}]]
                                                                         Text[Row[{"FGn error ||
                                                                                                                                                                                                                                                                                                                                                                                                                             ", TeXForm[FGn2TAr]}]]
                                                                        Text[" "]
                                                                         Text[Row[{"FGG ||
                                                                                                                                                                                                                                                                                                                                               ", KfGGp}]]
                                                                         Text[Row[{"FGG ||
                                                                                                                                                                                                                                                                                                                                              ", TeXForm[KfGGp]}]]
                                                                         Text[Row[{"FGG error ||
                                                                                                                                                                                                                                                                                                                                                                                                                           ", FGG2TAr}]]
                                                                         Text[Row[{"FGG error ||
                                                                                                                                                                                                                                                                                                                                                                                                                           ", TeXForm[FGG2TAr]}]]
                                                                         Text[" "]
                                                                        Text[" "]
                                                                         Text[Row[{"Omega error ||
                                                                                                                                                                                                                                                                                                                                                                                                                                   ", RKstepTayr}]]
                                                                         Text[Row[{"Omega error
                                                                                                                                                                                                                                                                                                                                                                   - 11
                                                                                                                                                                                                                                                                                                                                                                                                                                ", TeXForm[RKstepTayr]}]]
                                                                        Text[" "]
                                                                                                                                                                                                                                                                                                                      ", EA}]]
                                                                         Text[Row[{"EA ||
                                                                         Text[Row[{"EA ||
                                                                                                                                                                                                                                                                                                               ", TeXForm[EA] } ] ]
                                                                         Text[Row[{"Eerr || ", Eerr}]]
                                                                         Text[Row[{"Eerr || ", TeXForm[Eerr]}]]
   Out[236]= U < -Sqrt(gH)
 Out[237]=
   Out[238]= Fnn \parallel Gnp H + Rpp U
   \label{eq:output} \mbox{Out} \mbox{[239]= } Fnn \ || \ \text{Gnp} \ H + \text{Rpp} \ U
 \begin{array}{ll} \text{Out} \ [240] = & Fnn \ error \ || \ \left( -\frac{\left( H^2 \, k^3 \, U \, w \right) \, dt^2}{2 \, \left( 3 + H^2 \, k^2 \right)} - \frac{i \, H^2 \, k^3 \, U \, w^2 \, dt^3}{6 \, \left( 3 + H^2 \, k^2 \right)} + O[dt]^4 \right) + \left( \frac{1}{2} \, k^2 \, U \, dt + O[dt]^4 \right) dx \, + \\ & \left( \frac{i \, \left( 9 \, H^2 \, k^3 + 2 \, H^4 \, k^7 \right) U \, dt}{12 \, \left( 3 + H^2 \, k^2 \right)^2} + O[dt]^4 \right) dx^2 \, + \left( -\frac{1}{24} \left( k^4 \, U \right) dt + O[dt]^4 \right) dx^3 \, + O[dx]^4 \\ \end{array} 
   Out[241]= Fnn error |
                                                                                        \label{left-frac} $$\left(-\frac{dt}^2 \left(H^2 k^3 U \right)_{2 \in H^2 k^2+3\right)}-\frac{i \det(H^2 k^3 U w^2)_{6}}{2 \det(H^2 k^3 U w^2)_{6}} \right) $$
                                                                                                                            \label{left} $$\left(H^2 k^2+3\right)+O\left(\frac{dt}^4\right)\right)+\left(\frac{dt}^4\right)+\left(\frac{dt}^4\right)^2\ U^2+\frac{dt}^4\right)^2+\frac{dt}^4\left(\frac{dt}^4\right)^2+\frac{dt}^4\left(\frac{dt}^4\right)^2+\frac{dt}^4\left(\frac{dt}^4\right)^2+\frac{dt}^4\left(\frac{dt}^4\right)^2+\frac{dt}^4\left(\frac{dt}^4\right)^2+\frac{dt}^4\left(\frac{dt}^4\right)^2+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt}^4\left(\frac{dt}^4\right)^4+\frac{dt
                                                                                                                            \text{dt}+O\left(\frac{dt}^4\right)\right)+\left(\frac{dx}^2\right)-\left(\frac{dx}^4\right)-\frac{dx}^2
                                                                                                                             k^5 + U \left( \frac{dt}{dt} \right) + \left
                                                                                                                            \left(-\frac{1}{24}\left(k^4 U\right)\right) + \left(k^4 U\right) + \left(k
   Out[242]=
 Out[243]= FnG \parallel GGp H
   Out[244]= FnG \parallel \text{text}\{GGp\} H
  \text{Out} [245] = \text{ FnG error } || \left( -\frac{3 \left(k \, w\right) \, dt^2}{2 \left(3+H^2 \, k^2\right)} - \frac{i \, k \, w^2 \, dt^3}{2 \left(3+H^2 \, k^2\right)} + O[dt]^4 \right) \\ + \left( \frac{i \left(6 \, k^3 + H^2 \, k^5\right) \, dt}{4 \left(3+H^2 \, k^2\right)^2} + O[dt]^4 \right) dx^2 + O[dx]^4 + O[dx]^4
```

Out[247]=

Out[248]=  $FGn \parallel H(gRpp + Gnp U)$ 

Out[249]=  $FGn \parallel H(g \text{text}{Rpp}+\text{text}{Gnp} U)$ 

$$\begin{array}{l} \text{Out} [250] = \ FGn \ error \ || \ \left( -\frac{\left( k \left( 3 \ g \ H + g \ H^3 \ k^2 - 3 \ U^2 \right) w \right) dt^2}{2 \left( 3 + H^2 \ k^2 \right)} - \frac{i \ k \left( 3 \ g \ H + g \ H^3 \ k^2 - 3 \ U^2 \right) w^2 \ dt^3}{6 \left( 3 + H^2 \ k^2 \right)} + O[dt]^4 \right) + \left( \frac{1}{2} \ g \ H \ k^2 \ dt + O[dt]^4 \right) dx + \\ \left( \frac{i \left( 18 \ g \ H \ k^3 + 12 \ g \ H^3 \ k^5 + 2 \ g \ H^5 \ k^7 - 18 \ k^3 \ U^2 - 3 \ H^2 \ k^5 \ U^2 \right) dt}{12 \left( 3 + H^2 \ k^2 \right)^2} + O[dt]^4 \right) dx^2 + \left( -\frac{1}{24} \left( g \ H \ k^4 \right) dt + O[dt]^4 \right) dx^3 + O[dx]^4 \\ \end{array}$$

 $\left( H k^4\right) \left( H k^4\right) \left( \frac{dt}{dt} + O\left( \frac{dt}{dt} \right) \right) + O\left( \frac{dt}{dt} \right) + O\left( \frac{dt}$ 

Out[251]= FGn error ||

 $\label{left} $$\left(-\frac{\left(text\{dt\}^2 \left( H^3 k^2 + 3 g H - 3 U^2\right)\right)}{2 \left( H^2 k^2 + 3\right)} - \frac{1}{2} \left( text\{dt\}^3 k w^2 \left( H^3 k^2 + 3 g H - 3 U^2\right)\right)}{6 \left( H^2 k^2 + 3\right)} - \frac{1}{2} \left( text\{dt\}^3 k w^2 \left( H^3 k^2 + 3 g H - 3 U^2\right)\right)}{6 \left( H^2 k^2 + 3\right)} + O\left( text\{dt\}^4\right) + \frac{1}{2} g H k^2 \left( text\{dt\}^4\right) + \frac{1}{2} g H k^2 \left( text\{dt\}^4\right) + \frac{1}{2} g H^3 k^5 - 3 H^2 U^2 k^5 - 18 U^2 k^3 + 18 g H k^3\right) + \frac{1}{2} \left( H^2 k^2 + 3\right) + O\left( text\{dt\}^4\right) + \frac{1}{2} \left( H^2 k^3 + 18 g H k^3\right) + \frac{1}{2} \left( H^2 k^2 + 3\right) + O\left( text\{dt\}^4\right) + \frac{1}{2} \left( H^2 k^3 + 18 g H k^3\right) + \frac{1}{2} \left( H^2 k^2 + 18\right) + O\left( text\{dt\}^4\right) + \frac{1}{2} \left( H^2 k^3 + 18 g H k^3\right) + O\left($ 

Out[252]=

 $\label{eq:output} \text{Out[253]=} \quad FGG \;\; || \quad (GGp \; H + Rpp) \; U$ 

 $\label{eq:output} \textit{Out} \texttt{[254]=} \quad FGG \;\; || \quad U \; (\text{text} \{GGp\} \; H + \text{text} \{Rpp\})$ 

Out[255]= FGG error |

$$\left(-\frac{\left(k\left(6+H^{2}\,k^{2}\right)U\,w\right)dt^{2}}{2\left(3+H^{2}\,k^{2}\right)}-\frac{i\,k\left(6+H^{2}\,k^{2}\right)U\,w^{2}\,dt^{3}}{6\left(3+H^{2}\,k^{2}\right)}+O[dt]^{4}\right)+\left(\frac{1}{2}\,k^{2}\,U\,dt+O[dt]^{4}\right)dx+\left(\frac{i\left(36\,k^{3}+15\,H^{2}\,k^{5}+2\,H^{4}\,k^{7}\right)U\,dt}{12\left(3+H^{2}\,k^{2}\right)^{2}}+O[dt]^{4}\right)dx^{2}+\\ \left(-\frac{1}{24}\left(k^{4}\,U\right)dt+O[dt]^{4}\right)dx^{3}+\left(-\frac{i\left(108\,k^{5}+54\,H^{2}\,k^{7}+17\,H^{4}\,k^{9}+2\,H^{6}\,k^{11}\right)U\,dt}{240\left(3+H^{2}\,k^{2}\right)^{3}}+O[dt]^{4}\right)dx^{4}+O[dx]^{5}$$

Out[256]= FGG error |

 $\label{left-frac} $\left(-\frac{\left(t_{0} \times 2+6\right)}{2 \left(t_{0} \times 2+6\right)} + O\left(t_{0} \times 2+6\right)} + O\left(t_{0} \times 2+3\right) + O\left(t_$ 

Out[257]=

Out[258]=

Out[259]= Omega error || 
$$\left\{ \left( \frac{i \left( \sqrt{3} \cdot k \sqrt{g \cdot H (3 + H^2 \cdot k^2)} + 3 \cdot k \cdot U + H^2 \cdot k^3 \cdot U \right)^2 dt}{2 \cdot (3 + H^2 \cdot k^2)^2} - \frac{1}{3 \cdot (3 + H^2 \cdot k^2)^2} - \frac{1}{3 \cdot (3 + H^2 \cdot k^2)^2} \right) \right\}$$

$$\left( 468 \sqrt{g \, H \, (3 + H^2 \, k^2)} \, U^2 + 52 \, k^4 \sqrt{g \, H^9 \, (3 + H^2 \, k^2)} \, U^2 + \\ g \, H \, \left( 198 \sqrt{g \, H \, (3 + H^2 \, k^2)} \, U^2 + 52 \, k^4 \sqrt{g \, H^9 \, (3 + H^2 \, k^2)} \, U^2 + \\ g \, H \, \left( 198 \sqrt{g \, H \, (3 + H^2 \, k^2)} \, + \sqrt{3} \, \left( 585 + 378 \, H^2 \, k^2 + 61 \, H^4 \, k^4 \right) \, U \right) + \\ 6 \, k^2 \, \left( 9 \sqrt{g^3 \, H^3 \, (3 + H^2 \, k^2)} \, + 52 \sqrt{g \, H^3 \, (3 + H^2 \, k^2)} \, U^2 \right) \right) d^3 \right) / \left( 96 \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)} - \left( \left( k^2 \, \left( \sqrt{3} \, \sqrt{g \, H \, (3 + H^2 \, k^2)} \, + 3 + 12 \, k^2 \right) \, U \right)^3 \, \left( 576 \sqrt{g \, H \, (3 + H^2 \, k^2)} \, U^2 + 64 \, k^4 \sqrt{g \, H^9 \, (3 + H^2 \, k^2)} \, U^2 + 4 \right) \right) \right) d^3 \right) / \left( 96 \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)} \, U^2 + 4 \right) d^3 + 2 \right) d^3 + 2 \left( 21 \sqrt{g^3 \, H^7 \, (3 + H^2 \, k^2)} \, + \sqrt{3} \, \left( 693 + 450 \, H^2 \, k^2 + 73 \, H^2 \, k^2 \right) \, U \right) + 3 \, 3 \, k^2 \, \left( 21 \sqrt{g^3 \, H^7 \, (3 + H^2 \, k^2)} \, + 128 \sqrt{g \, H^3 \, (3 + H^2 \, k^2)} \, U^2 \right) \right) d^3 \right) / \left( 16 \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)^{1/2}} \right) + O(dd)^3 \, d^3 + 2 + \left( -\left( \left( i \, k^4 \, \left( \sqrt{3} \, g \, H \, (3 + H^2 \, k^2)^{1/2} \right) \right) + O(dd)^3 \, d^3 + 2 + \left( -\left( \left( i \, k^4 \, \left( \sqrt{3} \, g \, H \, (3 + H^2 \, k^2)^{1/2} \right) \right) + O(dd)^3 \, d^3 + 2 + 2 \right) \left( 384 \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)^{1/2}} \right) + O(dd)^3 \, d^3 + 2 + 2 \left( 39 \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)^{1/2}} \right) \right) \right) d^3 \right) / \left( 128 \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)^{1/2}} \right) + \left( k^5 \left( 9 \sqrt{3} \, g^2 \, H^2 \, (3 + H^2 \, k^2) \, U^2 + k^4 \sqrt{g \, H^9 \, \left( 3 + H^2 \, k^2 \right)} \, U^2 \right) \right) \right) d^3 \right) / \left( 128 \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)^{5/2}} \right) + \left( i k^6 \left( 9 \sqrt{3} \, g^2 \, H^2 \, (3 + H^2 \, k^2) \, U^3 + k^4 \sqrt{g \, H^9 \, \left( 3 + H^2 \, k^2 \right)} \, U^3 \right) \right) d^3 \right) / \left( 128 \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)} \, U \right) + 3 \left( g \, H^2 \, \left( 3 + H^2 \, k^2 \right) \, U^3 \right) \right) d^3 \right) d^3 \right) / \left( \left( k^2 \left( \sqrt{3} \, \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)} \, U^3 + k^4 \sqrt{g \, H^9 \, \left( 3 + H^2 \, k^2 \right)} \, U^3 + k^4 \sqrt{g \, H^9 \, \left( 3 + H^2 \, k^2 \right)} \, U^3 + k^4 \sqrt{g \, H^9 \, \left( 3 + H^2 \, k^2 \right)} \, U^3 + k^4 \sqrt{g \, H^9 \, \left( 3 + H^2 \, k^2 \right)} \, U^3 \right) \right) d^3 \right) \right) d^3 \right) / \left( \left( k^2 \left( \sqrt{3} \, \sqrt{g \, H \, \left( 3 + H^2 \, k^2 \right)} \, U$$

$$k^{4} \sqrt{g \, \Pi^{9} \, (3 + \Pi^{2} \, k^{2})} \, U)) / \left( 30720 \sqrt{g \, \Pi} \, \left( 3 + \Pi^{2} \, k^{2} \right)^{5/2} \right) + \\ \left( i \, k^{6} \, \left( 3 \, g \, H \, \left( 18432 \sqrt{g \, H \, (3 + H^{2} \, k^{2})} \right) + 51039 \, \sqrt{3} \, U + 45735 \, \sqrt{3} \, H^{2} \, k^{2} \, U + \\ 1381 \, \sqrt{3} \, H^{6} \, k^{6} \, U + k^{4} \, \left( 960 \, \sqrt{g \, H^{9} \, (3 + H^{2} \, k^{2})} \right) + 13717 \, \sqrt{3} \, H^{4} \, U) \right) + \\ 128 \, \left( 837 \, \sqrt{g \, H \, (3 + H^{2} \, k^{2})} \, U^{2} + 279 \, k^{4} \, \sqrt{g \, H^{9} \, (3 + H^{2} \, k^{2})} \, U^{2} + 31 \, k^{6} \, \sqrt{g \, H^{13}} \, \left( 3 + H^{2} \, k^{2} \right) \, U^{2} + 279 \, k^{4} \, \sqrt{g \, H^{9} \, (3 + H^{2} \, k^{2})} \, U^{2} \right) \right) dt \right) / \\ \left( 92 \, 160 \, \sqrt{g \, H} \, \left( 3 + H^{2} \, k^{2} \right)^{7/2} \right) - \left( \left( k^{7} \, \left( 9 \, \sqrt{3} \, g^{2} \, H^{2} \, (12 \, 999 + 6258 \, H^{2} \, k^{2} + 775 \, H^{4} \, k^{4} \right) + \\ g \, H \, U \, \left( 617 \, 661 \, \sqrt{3} \, H^{2} \, k^{2} \, U + 20 \, 551 \, \sqrt{3} \, H^{6} \, k^{6} \, U + 81 \, \left( 5888 \, \sqrt{g \, H \, (3 + H^{2} \, k^{2})} \, + 8053 \, \sqrt{3} \, U \right) + 3 \, k^{4} \, \left( 12 \, 288 \, \sqrt{g \, H^{9} \, (3 + H^{2} \, k^{2})} \, U^{3} + 66 \, k^{6} \, \sqrt{g \, H^{13}} \, \left( 3 + H^{2} \, k^{2} \right) \right) + \\ 128 \, \left( 23222 \, \sqrt{g \, H} \, \left( 3 + H^{2} \, k^{2} \right) \, U^{3} + 774 \, k^{4} \, \sqrt{g \, H^{9} \, \left( 3 + H^{2} \, k^{2} \right)} \, U^{3} + 86 \, k^{6} \, \sqrt{g \, H^{13}} \, \left( 3 + H^{2} \, k^{2} \right) \right) \right) + \\ 128 \, \left( 2322 \, \sqrt{g \, H} \, \left( 3 + H^{2} \, k^{2} \right) \, U^{3} + 774 \, k^{4} \, \sqrt{g \, H^{9} \, \left( 3 + H^{2} \, k^{2} \right)} \, U^{3} + 86 \, k^{6} \, \sqrt{g \, H^{13}} \, \left( 3 + H^{2} \, k^{2} \right) \right) \right) + \\ 128 \, \left( 2322 \, \sqrt{g \, H} \, \left( 3 + H^{2} \, k^{2} \right) \, U^{3} + 774 \, k^{4} \, \sqrt{g \, H^{9} \, \left( 3 + H^{2} \, k^{2} \right)} \, U^{3} + 86 \, k^{6} \, \sqrt{g \, H^{13}} \, \left( 3 + H^{2} \, k^{2} \right) \right) \right) + \\ 128 \, \left( 2322 \, \sqrt{g \, H} \, \left( 3 + H^{2} \, k^{2} \right) \, U^{3} + 774 \, k^{4} \, \sqrt{g \, H^{9} \, \left( 3 + H^{2} \, k^{2} \right)} \, U^{3} + 4 \, g \, H^{12} \, \left( 21253 \, \sqrt{3} \, g \, H^{9} + 7776 \, \sqrt{g \, H^{17} \, \left( 3 + H^{2} \, k^{2} \right)} \, U \right) + \\ 243 \, \left( 832 \, \sqrt{g \, H} \, \left( 3 + H^{2} \, k^{2} \right) + 4423 \, \sqrt{3} \, g^{2} \, H^{2} \, U^{2} + 2592 \, \sqrt{g \, H} \, \left( 3 + H^{2} \, k^{2} \right)} \, U^{4} + \\ g \, H \, U^{2} \, \left( 8322 \, \sqrt{g \, H}$$

$$\begin{split} gH^5 & U^2 \left( 347651 \sqrt{g} H(3+H^2 K^2) + 132703 \sqrt{g} + H^2 U + 234203 \sqrt{g} H'(3+H^2 K^2) + 0 \right) dt^4 + O[dt]^5 \right) dt^5 + O[dt]^5 dt^5 + O$$

$$\left[ \frac{1}{66\sqrt{g\,H} \, (3 + H^2\,k^2)^{1/2}} + \frac{1}{\sqrt{3}} \, \frac{3}{69} + 234\,H^2\,k^2 + 37\,H^4\,k^4)\,U \right) - \frac{4}{63\sqrt{g\,H} \, (3 + H^2\,k^2)} \, U^2 + 7\,k^4\sqrt{g\,H^9 \, (3 + H^2\,k^2)} \, U^2 + \frac{3}{3}\,k^2 \, \left( 3\sqrt{g^3\,H^7 \, (3 + H^2\,k^2)} \, U^2 + 7\,k^4\sqrt{g\,H^9 \, (3 + H^2\,k^2)} \, U^2 + \frac{3}{3}\,k^2 \, \left( 3\sqrt{g^3\,H^7 \, (3 + H^2\,k^2)} \, U^2 + 14\sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 \right) \right) dt \right) / \left( 96\sqrt{g\,H} \, \left( 3 + H^2\,k^2 \right)^{5/2} \right) - \left( \left( k^3 \, \left( \sqrt{3} \, \sqrt{g\,H \, (3 + H^2\,k^2)} \, U^2 + 3\,k^4\sqrt{g\,H^9 \, (3 + H^2\,k^2)} \, U^2 \right) \right) dt \right) / \left( 96\sqrt{g\,H} \, \left( 3 + H^2\,k^2 \right)^{-2} \right) - \left( 3 + H^2\,k^2 \right) U^2 + 8\,k^4\sqrt{g\,H^9 \, (3 + H^2\,k^2)} \, U^2 + \frac{3}{3}\,k^2 \, \left( 3\sqrt{g^3\,H^7 \, (3 + H^2\,k^2)} \, + 16\sqrt{g\,H^5 \, (3 + H^2\,k^2)} \, U^2} \right) \right) \right) dt^3 / \right) / \left( 96\left( \sqrt{g\,H} \, \left( 3 + H^2\,k^2 \right)^{-7/2} \right) + \left( i\,k^6 \, \left( \sqrt{3} \, \sqrt{g\,H \, (3 + H^2\,k^2)} \, U^2 + 8\,k^4\sqrt{g\,H^9 \, (3 + H^2\,k^2)} \, U^2 \right) \right) \right) dt^3 / \right) / \left( 96\sqrt{g\,H} \, \left( 3 + H^2\,k^2 \right)^{-7/2} \right) + \left( 198\sqrt{g\,H \, (3 + H^2\,k^2)} \, U^2 + 52\,k^4\sqrt{g\,H^9 \, (3 + H^2\,k^2)} \, U^2 + \frac{1}{2}\,k^2} \right) U^2 + \frac{1}{2}\,k^2 \, \left( 9\sqrt{g^3\,H^7 \, (3 + H^2\,k^2)} \, U^2 + 52\sqrt{g\,H^9 \, (3 + H^2\,k^2)} \, U^2 \right) \right) dt^3 / \left( 96\sqrt{g\,H} \, \left( 3 + H^2\,k^2 \right)^{9/2} \right) + \left( k^7 \, \left( \sqrt{3} \, \sqrt{g\,H \, (3 + H^2\,k^2)} \, - \left( 3 + H^2\,k^2 \right) U^3 \right) \right) \left( 576\sqrt{g\,H \, (3 + H^2\,k^2)} \, U^2 \right) dt^3 / \left( 96\sqrt{g\,H} \, \left( 3 + H^2\,k^2 \right)^{9/2} \right) + \frac{1}{2}\,k^2 \, \left( 9\sqrt{g^3\,H^7 \, (3 + H^2\,k^2)} \, - \sqrt{3} \, \left( 693 + 450\,H^2\,k^2 + 73\,H^4\,k^4 \right) U \right) + \frac{1}{3}\,k^2 \, \left( 21\sqrt{g^3\,H^7 \, (3 + H^2\,k^2)} \, - \sqrt{3} \, \left( 693 + 450\,H^2\,k^2 + 173\,H^4\,k^4 \right) U \right) + \frac{1}{3}\,k^2 \, \left( 21\sqrt{g^3\,H^7 \, (3 + H^2\,k^2)} \, + 128\sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 \right) \right) dt^4 / \left( 96\sqrt{g\,H} \, \left( 3 + H^2\,k^2 \right)^{11/2} \right) + \frac{1}{3}\,k^4 \, \sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 + \frac{1}{3}\,k^4 \, \sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 + \frac{1}{3}\,k^4 \, \sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 + \frac{1}{3}\,k^4 \, \sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 + \frac{1}{3}\,k^4 \, \sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 + \frac{1}{3}\,k^4 \, \sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 + \frac{1}{3}\,k^4 \, \sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 + \frac{1}{3}\,k^4 \, \sqrt{g\,H^3 \, (3 + H^2\,k^2)} \, U^2 + \frac$$

$$5 g H U \left(-96 \sqrt{g H (3 + H^2 k^2)} + \sqrt{3} \left(129 + 82 H^2 k^2 + 13 H^4 k^4\right) U\right) +$$

$$32 \left(9 \sqrt{g H (3 + H^2 k^2)} U^3 + k^4 \sqrt{g H^9 (3 + H^2 k^2)} U^3 + 2 k^2 \left(2 \sqrt{g^3 H^7 (3 + H^2 k^2)} U + 3 \sqrt{g H^5 (3 + H^2 k^2)} U^3\right)\right)\right) dt^2\right) / \left(128 \sqrt{g H} \left(3 + H^2 k^2\right)^{5/2}\right) +$$

$$\left(k^7 \left(-\sqrt{3} \sqrt{g H (3 + H^2 k^2)} + (3 + H^2 k^2) U\right) \left(24 \sqrt{3} g^2 H^2 (21 + 5 H^2 k^2) + 3 g H U \left(-717 \sqrt{g H (3 + H^2 k^2)} + \sqrt{3} \left(1011 + 646 H^2 k^2 + 103 H^4 k^4\right) U\right) -$$

$$5 \left(288 \sqrt{g H (3 + H^2 k^2)} U^3 + 32 k^4 \sqrt{g H^9 (3 + H^2 k^2)} U^3 + 3 k^2 \left(39 \sqrt{g^3 H^7 (3 + H^2 k^2)} U + 4 (3 + H^2 k^2) U + 4 (3 + H^2 k^2) U^3 + 32 k^4 \sqrt{g H^9 (3 + H^2 k^2)} U^3 + 3 k^2 \left(39 \sqrt{g^3 H^7 (3 + H^2 k^2)} U + 4 (3 + H^2 k^2) U^3 + 32 k^4 \sqrt{g H^9 (3 + H^2 k^2)} U^3 + 3 k^2 \left(39 \sqrt{g^3 H^7 (3 + H^2 k^2)} U + 4 (3 + H^2 k^2) U + 4 (3 + H^2 k^2)$$

$$\begin{aligned} & 64\sqrt{g\, H^2}(3+H^2\,k^2)\ U^3)))dt^3)\Big/ \big(384\sqrt{g\, H}\ (3+H^2\,k^2)^{72}\big) + \\ & \Big(i\,k^8\Big(\sqrt{3}\ \sqrt{g\, H}\ (3+H^2\,k^2) - (3+H^2\,k^2)\, U^2\Big)^2\Big(5\,\sqrt{3}\ g^2\, H^2\, (45+11\,H^2\,k^2) + \\ & g\, H\, U\Big(-990\,\sqrt{g\, H}\ (3+H^2\,k^2) + \sqrt{3}\ (1449+930\,H^2\,k^2+149\,H^4\,k^4)\, U\Big) - \\ & 2\Big(360\,\sqrt{g\, H}\ (3+H^2\,k^2)\ U^3 + 40\,k^4\,\sqrt{g\, H^9}\ (3+H^2\,k^2)\ U^3 + k^2\Big(137\,\sqrt{g^3\, H^7}\ (3+H^2\,k^2)\ U + \\ & 240\,\sqrt{g\, H^5}\ (3+H^2\,k^2)\ U^3\Big)\Big)\Big)dt^4\Big)\Big/\Big(128\,\sqrt{g\, H}\ (3+H^2\,k^2)^{9/2}\Big) + O[dt]^5\Bigg)dx^3 + \\ & \Big(k^3\Big(-3\,\sqrt{3}\ g\, H(543+146\,H^2\,k^2+15\,H^4\,k^4) + 256\Big(9\,\sqrt{g\, H^3}\ (3+H^2\,k^2) + 6\,k^2\,\sqrt{g\, H^3}\ (3+H^2\,k^2)^{9/2}\Big) + O[dt]^5\Bigg)dx^3 + \\ & k^4\,\sqrt{g\, H^9}\ (3+H^2\,k^2)\ U^3\Big)\Big)\Big/\Big(30720\,\sqrt{g\, H}\ (3+H^2\,k^2)^{5/2}\big) + \\ & k^4\,\sqrt{g\, H^9}\ (3+H^2\,k^2)\ U^0\Big)\Big/\Big(30720\,\sqrt{g\, H}\ (3+H^2\,k^2)^{5/2}\big) + \\ & (i\,k^6\Big(-3\,g\, H\,(3+H^2\,k^2)\ U^0\Big)\Big)\Big/\Big(30720\,\sqrt{g\, H}\ (3+H^2\,k^2)^{5/2}\big) + \\ & (i\,k^6\Big(-3\,g\, H\,(3+H^2\,k^2)\ U^0\Big)\Big)\Big/\Big(30720\,\sqrt{g\, H}\ (3+H^2\,k^2)^{5/2}\big) + \\ & 1381\,\sqrt{3}\, H^0\,k^6\,U + k^4\Big(-960\,\sqrt{g\, H^9}\ (3+H^2\,k^2) + 13777\,\sqrt{3}\, H^4\,U\Big)\Big) + \\ & 128\left(837\,\sqrt{g\, H\, (3+H^2\,k^2)}\ U^2 + 279\,k^4\,\sqrt{g\, H^9}\ (3+H^2\,k^2)\ U^2 + 31\,k^6\,\sqrt{g\, H^{13}}\ (3+H^2\,k^2)\ U^2 + \\ & 27\,k^2\Big(7\,\sqrt{g^2\, H^3}\ (3+H^2\,k^2) + 31\,\sqrt{g\, H^3}\ (3+H^2\,k^2)\ U^2\Big)\Big)\Big)dt\Big)\Big/\Big(92\,160\,\sqrt{g\, H}\ (3+H^2\,k^2)^{3/2}\Big) + \Big(k^2\,\Big(9\,\sqrt{3}\ g^2\,H^2\,(12\,999+6258\,H^2\,k^2 + 775\,H^4\,k^4\Big) + \\ g\,H\,U\Big(617\,661\,\sqrt{3}\ H^2\,k^2\,U^2 + 20\,551\,\sqrt{3}\ H^6\,k^4\,U + 81\,\Big(-5888\,\sqrt{g\, H\, (3+H^2\,k^2)}\ U^2 + \\ & 8053\,\sqrt{3}\,U\Big) - 3\,k^4\,\Big(12\,288\,\sqrt{g\, H^9}\ (3+H^2\,k^2)\ U^3 + 86\,k^6\,\sqrt{g\, H^{13}}\ (3+H^2\,k^2)\ U^3 + \\ & 9\,k^2\,\Big(229\,\sqrt{g^3\, H^7}\ (3+H^2\,k^2)\ U^3 + 774\,k^4\,\sqrt{g\, H^9}\ (3+H^2\,k^2)\ U^3\Big)\Big)\Big)dt^2\Big)\Big/\Big(92\,160\,\sqrt{g\, H}\ (3+H^2\,k^2)^{3/2}\Big) - \frac{1}{30720\,\sqrt{g\, H}\ (2+H^2\,k^2)^{3/2}} + k^8$$
 
$$\Big(k^8\,U^3\,\Big(-21\,253\,\sqrt{3}\,g\,H^9 + 7776\,\sqrt{g\, H^{12}}\ (3+H^2\,k^2)\ U\Big) + \\ 243\,\Big(832\,\sqrt{g^5\,H^3}\ (3+H^2\,k^2)\ - 4423\,\sqrt{3}\,g^2\,H^2\,U + 2592\,\sqrt{g\, H\, (3+H^2\,k^2)}\ U^3\Big)\Big)\Big)dt^2\Big)\Big)\Big) + \\ 92\,k^2\Big(-35\,319\,\sqrt{3}\,g^2\,H^4\,U - 91\,580\,\sqrt{3}\,g\,H^3\,U^3 + \\ 64\,\Big(59\,\sqrt{g^5\,H^3}\ (3+H^2\,k^2)\ - 42\,39\,\sqrt{g\, H^3}\ (3+H^2\,k^2)\ - 42\,60\,\sqrt{g\, H$$

$$\left(k^9 \left(\sqrt{3} \ \sqrt{g \ H \ (3 + H^2 \ k^2)} \ - (3 + H^2 \ k^2) \ U\right) \left(k^8 \ U^3 \left(-111559 \ \sqrt{3} \ g \ H^9 + 42368 \ \sqrt{g \ H^{17} \left(3 + H^2 \ k^2\right)} \ U\right) + \\ 27 \ k^2 \left(18078 \ \sqrt{g^5 \ H^9 \left(3 + H^2 \ k^2\right)} \ U\right) \left(k^8 \ U^3 \left(-111559 \ \sqrt{3} \ g \ H^9 + 42368 \ \sqrt{g \ H^{17} \left(3 + H^2 \ k^2\right)} \ U\right) + \\ 27 \ k^2 \left(18078 \ \sqrt{g^5 \ H^9 \left(3 + H^2 \ k^2\right)} \ - 172047 \ \sqrt{3} \ g^2 \ H^4 \ U + 372075 \ \sqrt{g^3 \ H^7 \left(3 + H^2 \ k^2\right)} \ U^2 - \\ 477940 \ \sqrt{3} \ g \ H^3 \ U^3 + 169472 \ \sqrt{g \ H^5 \left(3 + H^2 \ k^2\right)} \ U^4 \right) + \\ 9 \ k^4 \left(7035 \ \sqrt{g^5 \ H^{13} \left(3 + H^2 \ k^2\right)} \ - 153703 \ \sqrt{3} \ g^2 \ H^6 \ U + 254208 \ \sqrt{g \ H^9 \left(3 + H^2 \ k^2\right)} \ U^4 + \\ g \ H^5 \ U^2 \left(347651 \ \sqrt{g \ H \left(3 + H^2 \ k^2\right)} \ - 700818 \ \sqrt{3} \ U\right) \right) + \\ 81 \left(11603 \ \sqrt{g^5 \ H^5 \left(3 + H^2 \ k^2\right)} \ - 63917 \ \sqrt{3} \ g^2 \ H^2 \ U + 42368 \ \sqrt{g \ H \left(3 + H^2 \ k^2\right)} \ U^4 + \\ g \ H \ U^2 \left(132513 \ \sqrt{g \ H \left(3 + H^2 \ k^2\right)} \ - 122207 \ \sqrt{3} \ U\right) \right) - \\ 3 \ k^6 \ U \left(45573 \ \sqrt{3} \ g^2 \ H^8 - 169472 \ \sqrt{g \ H^{13} \left(3 + H^2 \ k^2\right)} \ U^3 + \\ g \ H^7 \ U \left(-108089 \ \sqrt{g \ H \left(3 + H^2 \ k^2\right)} \ + 456644 \ \sqrt{3} \ U\right) \right) \right) dt^4 + O[dt]^5 \right) dx^4 + O[dx]^5 \right\}$$

## Out[260]= Omega error ||

 $\label{left(h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} $$ \left( \frac{h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ \left( \frac{h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k^3+3 U k+sqrt{3} sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k^3+3 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right|)} k\right) $$ (h^2 U k+sqrt{g H left(H^2 k^2+3\left| k\right$  $\label{eq:left(H^2 k^2+3\right)} $$ k^2+3\right) -\frac{h^2 k^2+3\left(H^2 k^2+3\right)} U+\sqrt{3} \sqrt{3} \left(H^2 k^2+3\right)\right) + \frac{h^2 k^2+3\left(H^2 k^2+3\right)}{H^2 k^2+3\left(H^2 k^2+3\right)} $$$  $\left(\frac{3 \text{ gH+U left(left(H^2 k^2+3 \text{ right) U+2 sqrt{3} sqrt{g H \left(H^2 k^2+3 \text{ right)} right) right)}}{1}\right)$  $\label{left(H^2 k^2+3) ight)^2} - \frac{k^4 \left(H^2 k^2 + 3\right) + \frac{4}{4} \cdot H^2 k^2 + \frac{3}{4} \cdot H^2 k^2 + \frac{3}{4$  $k^2+3\right) \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \right) \right) \right) \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \left( H^2 + \frac{1}{2} \right) \right) \right) \right)$  $k^2+9 \left(U+\sqrt{3} \right) \left(U+\sqrt{3} \right$  $\label{eq:left} $\operatorname{H}\left(H^2 k^2+3\right) H\right) + \frac{dt}^3}{4 \left(H^2 k^2+3\right)^3} + \frac{k^5 \left(H^2 k^5\right)^3}{4 \left(H^2 k^5\right)^3} + \frac{k^5 \left$  $k^2+3\right\} \ U+\sqrt{3} \ H \left( H^2 k^2+3\right) \ U+C H^2 U k^4+2 \left( H^3 U H^2+2 H^2 U h^4 U h^4+2 H^2 U h^4+2 U h^4+2$  $\$  \sqrt{3} \sqrt{g H^5 \left(H^2 k^2+3\right)} \right) \right) \\ k^2+9 U+12 \sqrt{3} \sqrt{g H \left(H^2 k^2+3\right)} \right) \\ right)  $U^3+6 g H \left( \frac{h^2 k^2+3\right) U+2 \left( H^2 k^2+3\right) U+2 \left( H^2 k^2+3\right) U+9 g^2}{h^2 H \left( H^2 k^2+3\right) U+9 g^2}$  $H^2\left(\frac{dt}^5 \left(\frac{dt}^4}{5 \left(\frac{dt}^4}\right)^4\right) + \left(\frac{dt}^6 \left(\frac{dt}^4}{5 \left(\frac{dt}^4}\right)^4\right) + \left(\frac{dt}^6 \left(\frac{dt}^4}{5 \left(\frac{dt}^4}\right)^4\right) + \left(\frac{dt}^4 \left(\frac{dt}^4}{5 \left($  $\label{left} $\left(2 U + \sqrt{1} \right) -\frac{U + \sqrt{1}}{rac} \left(2 U + \sqrt{1} \left(\frac{H^2 k^2 + 3}{right}\right) -\frac{1}{rac} \left(\frac{H^2 k^2 + 3}{right}\right) U + \sqrt{3} \right) \\$ \sqrt{g H \left(H^2 k^2+3\right)}\right) \left(\sqrt{3} g H+2 \sqrt{g H \left(H^2 k^2+3\right)} U\right)\right)  $\label{left} $$ \operatorname{dt}_{4 \leq t}(\operatorname{dt}_{4 \leq t})^{3/2}\right]-\frac{i^{4} \left(\operatorname{dt}_{3 \leq t}^{2} + \operatorname{dt}_{3 \leq t}^{2} + \operatorname$ \left(H^2 k^2+3\right)\ U\right) \left(3 g H+U \left(\left(H^2 k^2+3\right) U+2 \sqrt{3} \sqrt{g H \left(H^2  $k^2+3\right) \left( k^2+3\right) \left( k^2+3\right)$  $g H+2 \left( H^2 k^2+3\right) \left( H^2 k^2+3\right) \left( H^4 U k^4+3 \left( H^4 U k^4+3 \right) \right)$  $H^5 \left(H^2 k^2+3\right) \right) + H^5 \left(H^2 k^2+3\right) + H^5 \left(H^2 k^2+3\right) \right) + H^5 \left(H^2 k^2+3\right) + H^5 \left(H^4 k^2+3\right) + H^5 \left(H^4$  $U^2+3 g \left( \frac{k^2 U H^3+9 U H+\sqrt{3} \right) + \left( \frac{k^2 + 3 \right) H \left( \frac{k^2 + 3 \right) H}{1 + \frac{k^2 + 3 \right) H}} H \left( \frac{k^2 U H^3+9 U H+\sqrt{3} \right) + \frac{k^2 U H^3+9 U H+\sqrt{3} \left( \frac{k^2 U H^3+9 U H+\sqrt{3} \right) H}{1 + \frac{k^2 U H^3+9 U H+\sqrt{3} \left( \frac{k^2 U H+\sqrt{3} \right) H}{1 + \frac{k^2 U H+\sqrt{3} U H+\sqrt{3$  $\left( H^2 k^2+3\right)^{5/2}+\frac{k^6 \left( \sqrt{3} gH+2 \right)^2 H^2 k^2+3\right)^{5/2}+\frac{k^6 \left( \sqrt{3} gH+2 \right)^2 H^2 k^2+3\right)^{5/2}}{H^2 k^2+3\left( \sqrt{3} gH+2 \right)^2 H^2 k^2 H^2$  $U + \frac{1}{2} \left( \frac{H^4 U k^4+2 \left( \frac{U H^2+2 \left( \frac{H^5 \left( \frac{H^2 k^2+3 \right)}{H^5} \right) \left( \frac{H^2+2 \left( \frac{H^2 U H^2+1 \right)}{H^5} \right) \left( \frac{H^5 U H^2+1 \right) \left( \frac{H^5 U H^4+1 \right) \left( \frac{$  $U+12 \sqrt{3} \sqrt{4}$  H \left( $H^2 k^2+3\right)$  U+12 \sqrt{3} \sqrt{6 H \left( $H^2 k^2+3\right)$  U+2  $\label{left} $$k^2+3\right)^{5/2}+O\left(\frac{dt}^5\right)\right) \cdot \left(\frac{dt}^4-\frac{dt$ k^2+13\right)+16 \left(\sart{g H^5 \left(H^2 k^2+3\right)} k^2+3 \sart{g H \left(H^2 k^2+3\right)}\right)

. = 1 to utgute) 1 to uete, werte; 5 tt o uete, tt = u = 10 utgute), u = 10 werte; 5 tt uete, tt = u = 10 utgute), utgute  $\label{left} $$U\rightarrow H^2 \end{ar} $$ \operatorname{H} \left(H^2 \end{ar} \right)^{3/2}\right) -\frac{i \end{ar} H \left(H^2 \end{ar} \right)^{3/2}\right)^{3/2}\right) -\frac{i \end{ar} H \left(H^2 \end{ar} \right)^{3/2}\right)^{3/2}\right)^{3/2}\right)^{3/2}} $$$ H^4 k^4+234 H^2 k^2+369\right) U+144 \sqrt{g H \left(H^2 k^2+3\right)\right)+4 \left(7 \sqrt{g H^9}  $\label{eq:homogeneous} $\left(H^2 k^2+3\right) U^2 k^4+3 \left(H^4 \right) H^5 \left(H^2 k^2+3\right) U^2+3 \right) U^2+3 \left(H^2 k^2+3\right) U^2+3 \left(H^2 k^2+3\right) U^2+3 \left(H^2 k^2+3\right) U^2+3 \left(H^2 k^2+3\right) U^2+3 U^$  $\label{left(H^2 k^2+3\left| h(H^2 k^2+3\right| U^2\right) U^2\left| h(H^2 k^2+3\right| U^2\right) U^2\left| h(H^2 k^2+3\right| U^2\right| U^2\right| U^2\left| h(H^2 k^2+3\right| U^2\right| U^2\left| U^2\right| U^2\left| h(H^2 k^2+3\right| U^2\right| U^2\left| h(H^2 k^2+3\right| U^2\right| U^2\left|$  $\$  \\ \left(H^2 k^2+3\right)^{5/2}}+\\ \frac{k^5}\\ left(\\ left(H^2 k^2+3\right) U+\\ sqrt{3}\\ sqrt{g H}  $\left( H^2 k^2+3\right) \right) \left( H^2 k^2+3\right) \left$  $\label{eq:left_hamiltonian} $$ \left( h^2 k^2 + 3\right) \right) + \left( h^2 k^2 + 3\right) \left($  $\sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+3 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} \right) v^2+3 \sqrt{g H}$  $\left(\frac{4t}^2 k^2+3\right) U^2\right) U^2\right) + \left(\frac{4t}^2 k^2+3\right) U^2\right) U^2\left(\frac{4t}^2 k^2+3\right) U^2\left(\frac{4t}^2 k$  $k^6 \left( H^2 k^2 + 3\right) + H \left($  $\left(H^2 k^2+3\right) U^2 k^4+6 \left(52 \right) H^5 \left(H^2 k^2+3\right) U^2+9 \right) U^2+9$  $\left(H^2 k^2+3\right) \ h^2+468 \ grt{g H \left(H^2 k^2+3\right) \ U^2+g H \left(grt{3} \right) \ heft(61 \ heft(H^2 k^2+3) \$  $H^4 k^4+378 H^2 k^2+585 + U+198 + 198 +$  $\$  \\left(\(H^2 k^2+3\right)^{9/2}\-\\frac{\\left(k^7 \\left(\\left(H^2 k^2+3\right) U+\\sqrt{3} \\sqrt{g}})  $H \left( \frac{H^2 k^2+3\right)}{0.0000}$  $\$  \\sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+21 \\sqrt{g^3 H^7 \left(H^2 k^2+3\right)}\\right) k^2+576  $\sqrt{g} H \left( \frac{h^2 k^2+3\right)} U^2+g H \left( \frac{3}{h^4 k^4+450 H^2 k^2+693\right)}$  $U+225 \left( H \left( H^2 k^2+3\right) \right)\right) \left( H^2 k^2+3\right) \left($ g H \left(7 H^2 k^2+3\right)+16 \left(\sqrt{g H^5 \left(H^2 k^2+3\right)} k^2+3 \sqrt{g H \left(H^2 k^2+3\right)} k^2+3 \sqrt  $k^2+3\right) \ U\right) \ 1384 \ sqrt{g H} \left(H^2 k^2+3\right)^{3/2}+\frac{k^5 \left(H(g H \left(sqrt{3} + h^2 + h^$  $\label{left(19 H^4 k^4+126 H^2 k^2+207 right) U+72 sqrt{g H \left(H^2 k^2+3\right)}/right)+16 \left(\sqrt{g} H^2 k^2+3\right)}/right)+16 \left(\sqrt{g} H^2 k^2+3\right)/right)+16 \left(\sqrt{g} H^2 k^2+$  $H^9 \left( H^2 k^2 + 3 \right) U^2 k^4 + \left( 6 \right) H^5 \left( H^2 k^2 + 3 \right) U^2 + \left( H^2 k$  $\left(H^2 k^2+3\right) \$  \left(H^2 k^2+3\right) \right) \right) \\ \left(H^2 k^2+3\right) \\ U^2\right) \\ \text{dt}{128}  $\$  \\sqrt{g H} \\left(H^2 k^2+3\right)^{5/2}}+\\frac{i k^6 \\left(9 \\sqrt{3} g^2 \\left(3 H^2 k^2+13\right) H^2+5}{} g U \left(\sqrt{3} \left(13  $h^4 k^4 + 82 h^2 k^2 + 129 \right) U + 96 \left( H \left( h^2 k^2 + 3 \right) \right) right)$  $U^3+2 \left( 4^2 +^2 \right) U^3+2 U^3$  $k^2+3\right) U+\sqrt{3} \left( H^2 k^2+3\right) \left( H$  $k^2+21\right$  H<sup>2</sup>+3 g U \left(\sqrt{3} \left(103 H<sup>4</sup> k<sup>4</sup>+646 H<sup>2</sup> k<sup>2</sup>+1011\right) U+717 \sqrt{g}  $\$  \\sqrt{g H^5 \left(H^2 k^2+3\right)} U^3+39 \\sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U\right) k^2+288  $\sqrt{gH \left(H^2 k^2+3\right)} U^3\right) \times \left(H^2 k^2+3\right) U^3\right)$  $k^2+3\right)^{7/2}\right)-\frac{k^2+3\right)^{7/2}\right)-\frac{k^2+3\right)^{7/2}}$  $k^2 + 3 \right) \ U^3 \ k^4 + 2 \left(80 \right) \ H^9 \left(H^2 \ k^2 + 3 \right) \ U^3 \ k^4 + 2 \left(40 \right) \ H^5$  $\left(H^2 k^2+3\right) U^3+5 \left(H^2 k^2+45\right) U^3+5 \left(H^2 k^2+45\right) U^3+5 \left(H^2 k^2+45\right) U^3+6 U^3+6$  $H^4 k^4 + 930 H^2 k^2 + 1449 \cdot U + 990 \cdot H^2 k^2 + 3 \cdot H$  $\left( H \left( H^2 k^2 + 3\right) \right) \left( H^2 k^2 + 3\right) \right)$  $\sqrt{3} g H \left(15 H^4 k^4+146 H^2 k^2+543\right) +256 \left(15 H^9 \left(15 H^2 k^2+3\right)\right)$  $k^4+6 \operatorname{qt}(H^2 k^2+3\operatorname{right}) k^2+9 \operatorname{qt}(H^2 k^2+3\operatorname{right}) \operatorname{dr}(H^2 k^2+3\operatorname{right}) \operatorname{dr}(H^2 k^2+3\operatorname{right})$  $\left( \frac{H}{13717} \right) \left( \frac{H}{13717} \right) \left( \frac{H^2 k^2 + 3 \right) \left( \frac{H^2$ 

\sqrt{3} U H^4+960 \sqrt{g H^9 \left(H^2 k^2+3\right)\right) k^4+45735 \sqrt{3} H^2 U k^2+51039  $\$  \\ \quad \\ H\\left(H^2 \\ \^2+3\\ \right)\\ H(31 \\ H^{13} \\ H^{13} \\ H^2 \\ H  $k^2+3\right) U^2 k^6+279 \sqrt{H^2 k^2+3\right) U^2 k^4+27 \left(31 \right) 1$  $\label{left} $$\left(H^2 k^2 + 3\right) \ U^2 + 1 \right] U^2 + 1 \left(H^2 k^2 + 3\right) \right] \ k^2 + 3 \right) \ k^2 + 3 \left(H^2 k^2 + 3 \right) \left(H^2 k^2 +$ \left(9 \sqrt{3} g^2 \left(775 H^4 k^4+6258 H^2 k^2+12999\right) H^2+g U \left(20551 \sqrt{3} H^6 U k^6+3 \left(65021 \sqrt{3} U H^4+12288 \sqrt{g H^9 \left(H^2 k^2+3\right)}\right) k^4+617661 \sqrt{3} H^2 U k^2+81 \left(8053 \sqrt{3} U+5888 \sqrt{g H \left(H^2 k^2+3\right)\right)\right)\right) H+128 \left(86  $\$  \\sqrt{g H^{13} \\left(H^2 k^2+3\right)} U^3 k^6+774 \\sqrt{g H^9 \\left(H^2 k^2+3\right)} U^3 k^4+9  $H} \left( \frac{h^2 k^2+3 \right)^{7/2} \right) - \frac{i k^8 \left( U^3 \left( \frac{21253 \right) gH^9+7776 \right)}{16}}{h^9 + h^9 + h^$  $H^{17} \left( H^2 k^2 + 3 \right) \ U\right) \ h^8 + 3 \ U \left( 9181 \right) \ g^2 H^8 + 4 \ g \ U \left( 21787 \right) \ sqrt{3}$  $U+5312 \operatorname{left}(H^2 k^2+3\right) H^7+31104 \operatorname{left}(H^2 k^2+3\right)$  $U^3 + b^4 = 1331 + 3 g^2 U + 6 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U^2 + 6 f^3 = 13 U + 34336 + 2 g U + 2 U + 6 f^3 = 13 U + 34336 + 2 U + 2$  $\label{left(H^2 k^2+3\wedge ight)} $$ \left( H^5 + 28 \left( 162 \right) H^5 + 28 \left( 162 \right) H^9 \left( H^2 k^2 + 3 \right) U^4 + 5 \right) $$$  $H^{13} \left(H^2 k^2+3\right)\right) \$ g U^3 H^3+64 \left(486 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^4+1155 \sqrt{g^3 H^7 \left(H^2  $\left(H^2 k^2+3\right) U^4+g H\left(17823 \right) U+8832 \left(H^2 k^2+3\right) U+8832 \right)$  $U^2+4423 \sqrt{3} g^2 H^2 U+832 \sqrt{g^5 H^5 \left(\frac{H^2 k^2+3\right)}{\sinh(H^2 k^2+3\right)}} \left(\frac{1}{3} 30720 -\frac{1}{3} \frac{1}{3} \frac{1}$  $\$  \\sqrt{g H} \\left(H^2 k^2+3\right)^{9/2}}+\\frac{k^9 \\left(\\left(H^2 k^2+3\right) U+\\sqrt{3} \\sqrt{g H}}  $\left(H^2 k^2+3\right)\right)\right) \left(H^2 k^2+3\right) \left(H^2 k^2+$ k^2+3\right)} U\right) k^8+3 U \left(45573 \sqrt{3} g^2 H^8+g U \left(456644 \sqrt{3} U+108089  $\left( H^2 k^2+3\right) H^7+169472 \right) H^7+169472$  $k^6+9 \left(153703 \right) qrt{3} g^2 U H^6+g U^2 \left(700818 \right) U+347651 \left(9 H \left(153703 \right) H^6+g U^2 \right) U+347651 U+34761 U+347$  $k^2+3\right) h^5+254208 \left( H^9 \left( H^2 k^2+3\right) \right) U^4+7035 \left( H^5 H^5 H^6\right) h^6$ k^2+3\right)\right) k^4+27 \left(172047 \sqrt{3} g^2 U H^4+477940 \sqrt{3} g U^3 H^3+169472  $\$  \\sqrt{g H^5 \left(H^2 k^2+3\right)} U^4+372075 \\sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^2+18078 H \left(122207 \sqrt{3} U+132513 \sqrt{g H \left(H^2 k^2+3\right)\right) U^2+63917 \sqrt{3} g^2 H^2  $U+11603 \left( g^5 H^5 \left( H^2 k^2 + 3\right) \right) \left( g^5 H^5 \left( H^2 k^2 + 3\right) \right) \left( g^6 H^2 k^2 + 3\right) \left( g^6 H^2 k^2 + 3\right)$  $\label{left(H^2 k^2+3\rightarrow U-\sqrt{3} \sqrt{4} H \left(\frac{H^2 k^2+3\right)} U^{-sqrt{3} \sqrt{3} H \left(\frac{H^2 k^2+3\right)}\right)/right)} \\$  $\left(3 g H+U \left(\frac{h^2 k^2+3\right) U-2 \sqrt{3} \right) + \left(\frac{h^2 k^2+3\right)} \right) = h^2 \left(\frac{h^2 k^2+3\right) \left(\frac{h^2 k^2+3\right)}{h^2 k^2+3\right)}$  $\label{left} $$\left(dt^2 k^2+3\right)^2-\frac{k^4 \left(\frac{h^2 k^2+3\right) U-\sqrt{4} H}{k^2 k^2+3\right) U-\sqrt{4} H} dt^2 k^2+3\right) U-\sqrt{4} H}$$$  $\label{left(H^2 k^2+3\left(H^2 W^4-3\left(K^4-3\left(K^4-4\right) K^4-3\right)\right)} \left(K^4-3\left(K^4-3\right) \left(K^4-3\right) \left(K^4-3$  $H^2 U \mapsto k^2+9 U-9 \sqrt{3} \left(H^2 k^2+3\right) U-2+3 g H \left(H^2 k^2+3\right)$  $k^2+3\right) \ U-\sqrt{3} \ grt{g H \left(H^2 k^2+3\right)\right) \ text{dt}^3}{4 \left(H^2 k^2+3\right)}$  $k^2+3 \right) + \frac{k^5 \left(\frac{k^5 \left(\frac{k^5 \left(\frac{k^2 + 3\right)}{U}}{U}\right)}{U-\sqrt{3}}\right)}{U-\sqrt{3}} + \frac{k^5 \left(\frac{k^5 \left(\frac{k^5 + 2}{U}\right)}{U}\right)}{U-\sqrt{3}} + \frac{k^5 \left(\frac{k^5 + 2}{U}\right)}{U-\sqrt{3}} + \frac{k^5 \left(\frac{k^5 + 2}{U}\right)}{$  $\left( \frac{H^4 U k^4+\left( H^2 U-4 \right) -4 \left( H^5 \left( H^5 \right) + \frac{4 \cdot H^5 \left( H^2 k^2+3 \right) + \frac{4 \cdot H^5 \left( H^5 \right) -4 \cdot H^5 \left( H^5 \right) -4 \cdot H^5 \left( H^5 \right) + \frac{4 \cdot H^5 \left($  $U-12 \sqrt{3} \sqrt{g H \left(\frac{H^2 k^2+3\right)}}\right) U^3+6 g H \left(\frac{H^2 k^2+3\right)}$ 

 $U-2 \sqrt{4}$  \sqrt{3} \sqrt{g H \left(H^2 k^2+3\right)\right) U+9 g^2 H^2\right) \text{dt}^4\{5 \left(H^2 k^2+3\right)\right) \right}  $\label{left} $$k^2+3\right)^3}+O\left(\frac{d^{5}\right)+\left(\frac{1}{4} i k^2 \left(\frac{3} \sqrt{3} \right)^3\right)^3}{(1+i)^3}+O\left(\frac{3}{4} i k^2 \left(\frac{3} i k^2 \right)^3\right)^3+O\left(\frac{3} i k^2 i k^2 \right)^3}$  $H_{4^2 k^2+3}=2 U\right+ \frac{k^3 \left(\frac{k^3 \left(\frac{k^2 k^2+3\right)}{U-\sqrt{k^2+3}}\right) U-\sqrt{k^2+k^2+3}}{U-\sqrt{k^2+3}}$  $k^2+3\right) \left( \frac{1}{4 \operatorname{sqrt}{g H \cdot h^2 k^2+3\right)} U\right) \left( \frac{1}{4 \operatorname{sqrt}{g H \cdot h^2 k^2+3}} U\right) \left( \frac{1}{4 \operatorname{sqrt}$  $\left(H^2 k^2+3\right)^{3/2}+\frac{k^4 \left(\sqrt{3}gH-2\right)gH-2 \left(H^2 k^2+3\right)}{U\right)} U\right)$  $\label{left} $$\left(\frac{3 g H+U \left(\frac{h^2 k^2+3\right)} U-2 \right) + \left(\frac{3 g H+U \left(\frac{h^2 k^2+3\right)}{right}} U-2 \right)} $$$  $\t \{dt\}^2\} \{ \sqrt{dt}^2 + \sqrt{dt}^2 + \sqrt{dt}^2 \} - \frac{dt}^2 \} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 \} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 }{dt} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 }{dt} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 }{dt} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 }{dt} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 }{dt} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 }{dt} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 }{dt} = \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 + \frac{dt}^2 }{dt} = \frac$  $\left(H^2 k^2+3\right) U\right) \left(H^4 U k^4-3\left(4 U k^4-3 \left(4 H^5 \left(4 H^5 k^2+3\right)\right)\right)\right)$  $H^2 U = h^2 U - 9 \left( H^2 \left( H^2 \left( H^2 \right) \right) \right)$  $k^2+3\right) U-\sqrt{3} \left( H \left( h^2 k^2+3\right)\right) \left( h^2 k^2+3\right) \left( h^2 k^2+$  $H} \left(\frac{h^2 k^2+3\right)^{5/2}\right) - \frac{k^6 \left(\frac{h^2 k^2+3\right)^{5/2}}{h^2 k^2+3\right)^{1/2}}}{h^2 k^2+3\left(\frac{h^2 k^2+3\right)^{1/2}}{h^2 k^2+3\left(\frac{h^2 k^2+3\left(\frac{h^2 k^2+3\right)^{1/2}}{h^2 k^2+3\left(\frac{h^2 k^2+3\left(\frac{h^2 k^2+3\right)^{1/2}}{h^2 k^2+3\left(\frac{h^2 k^2+3\right)^{1/2}}{h^2 k^2+3\left(\frac{h^2 k^2$  $U = U + \frac{1}{2} \left( H^2 U^4 - \frac{1}{2} \right) \left( H^2 U^4 - \frac{1}{2} \right)$  $U-2 \sqrt{3} \sqrt{3} \sqrt{4} 4 \sqrt{2+3}\right) U+9 g^2 H^2\right) \left( \frac{4}{3} \right)$  $\left(\frac{4t}{5}\right) \cdot \left(\frac{4t}{5}\right) \cdot \left(\frac{$  $H \left(3 + 2 k^2 + 1\right) - 16 \left(\frac{4 + 2 k^2 + 3 \right) U k^2 + 3 \left(\frac{4 k^2 + 3 \right) U k^2 + 3 \left(\frac{4 k^2 + 3 \right)}{U k^2 + 3 \left$  $k^2+3\right) U\right) U\right) \{96 \right) \{97 + 3\right) \{97 + 3\right\}$ \left(37 H^4 k^4+234 H^2 k^2+369\right) U-144 \sqrt{g H \left(H^2 k^2+3\right)}\right)-4 \left(7  $\$  \\sqrt{g H^9 \left(H^2 k^2+3\right)} U^2 k^4+3 \left(14 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+3  $\left(\frac{g^3 H^7 \left(H^2 k^2+3\right)}\right) k^2+63 \right) k^2+63$  $\label{eq:k-2+3-right} $$ k^2+3\right)-\left(H^2 k^2+3\right)+\left(H^2 k^2+3\right)-\left(H^2 k^2+3\right)+H^2 k^2+3\left(H^2 k^2+3\right)-\left(H^2 k^2+3\right)-\left(H^2 k^2+3\right)-\left(H^2 k^2+3\right)-\left(H^2 k^2+3\right)+H^2 k^2+3\left(H^2 k^2+3\right)-\left(H^2 k^2+3\right)+H^2 k^2+3\left(H^2 k^2+3\right)+H^2 k^2+3\left(H^2 k^2+3\right)-H^2 k^2+3\left(H^2 k^2+3\right)$ \left(49 H^4 k^4+306 H^2 k^2+477\right) U\right)+5 \left(8 \sqrt{g H^9 \left(H^2 k^2+3\right)} U^2  $k^4+3 \left(\frac{4}{5} H^5 \left(\frac{4^2 + 3\right)} U^2+3 \right) U^2+3 \left(\frac{4^2 + 3^2 + 3^2}{16} H^7 \left(\frac{4^2 + 4^2 + 3^2 + 3^2}{16} H^7 \right)\right)$  $k^2 + 72 \left( H \left( H^2 k^2 + 3\right) \right) U^2\right) \left( H^2 k^2 + 3\right)$  $\left(H^2 k^2+3\right)^{7/2}\right)+\frac{k^6 \left(\sqrt{3} \sqrt{3} \right)}{16H(H^2 k^2+3\right)}-\left(H^2 k^2+3\right)^{7/2}\right)$  $k^2+3\right) U\right) U\right) U + (52 \left( \frac{4}{5} \right) U + (6) U + (6$  $\label{left} $$\left(H^2 k^2 + 3\right) \ U^2 + 9 \right(H^2 k^2 + 3\right) \ h^2 + 68 \ y \ H \left(H^2 k^2 + 3\right) \ h^2 + 68 \ y \ h^2 + 68 \ h^2 +$  $k^2+3\right) U^2+g H \left(198 \right) -\$  $\left(\frac{3} \left(\frac{4 \cdot 4^2 + 3 \cdot (H^2 k^2 + 3 \cdot (H^2 k^2$ H^9 \left(H^2 k^2+3\right)} U^2 k^4+3 \left(128 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+21  $\sqrt{g^3 H^7 \left(\frac{4^2 k^2+3\right)} \left(\frac{4^2 k^2+3\right)} U^2+g}$  $H \left(\frac{25 \operatorname{ft}(H^2 k^2+3\right)}{\operatorname{sqrt}(3) \left(\frac{3}{10} H^4 k^4+450 H^2 k^2+693\right)} \right)$ \text{dx}^2+\left(\frac{i k^4 \left(\sqrt{3} g H \left(7 H^2 k^2+33\right)-16 \left(\sqrt{g H^5 \left(H^2  $k^2+3\right) U k^2+3 \left( H \left( h^2 k^2+3\right) U\right) \left( h^2 k^2+3\right) \left( h^2 k^$  $k^2+3\right)^{3/2}+\frac{k^5\left(H + \left(H^2 \right)^{2/2} + \left(H^2 \right)^{-2/2}}{k^2+3\right)^{-2/2}} \left(H^2 + \left(H^2 \right)^{-2/2} + \left(H^2 \right)^{-2/2}$ k^4+126 H^2 k^2+207\right) U\right)+16 \left(\sqrt{g H^9 \left(H^2 k^2+3\right)} U^2 k^4+\left(6)  $\$  \sqrt{g H^5 \left(H^2 k^2+3\right)} U^2+\sqrt{g^3 H^7 \left(H^2 k^2+3\right)}\right) k^2+9 \sqrt{g H}  $\label{left(H^2 k^2+3\circ h) U^2\circ h} $$\left(H^2 k^2+3\right) U^2\right)^{5/2}+\frac{dt}{128 \cdot gH} \left(H^2 k^2+3\right)^{5/2}+\frac{dt}{128 \cdot gH} \right)^{5/2}+\frac{dt}{128 \cdot gH} \left(H^2 k^2+3\right)^{5/2}+\frac{dt}{128 \cdot g$  $k^6 \left(-9 \right) ^3 g^2 \left(3 +^2 k^2 + 13\right) + h^2 - 5 g U \left(3 +^2 k^2 + 13\right) + h^2 - 4 h^2 + h^2 + h^2 - 4 h^2 + h^2 +$  $H^2 k^2+129 \right) U-96 \left(H^2 k^2+3\right) H+32 \left(h^2 k^2+3\right) H+32 \left(h^2 k^2+129\right) H+32 \left(h^2 k^2+12$ 

k^2+3\right)} U^3 k^4+2 \left(3 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^3+2 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)}  $k^2+3\right) U\cdot h^2+9 \left( H\cdot h^2 k^2+3\right) U^3\right) text{dt}^2{128}$  $\$  \\sqrt{g H} \\left(H^2 k^2+3\right)^{5/2}}+\\frac{k^7 \\left(\\left(H^2 k^2+3\right) U-\\sqrt{3} \\sqrt{g H}}  $\left(H^2 k^2+3\right)\right)$ \left(103 H^4 k^4+646 H^2 k^2+1011\right) U-717 \sqrt{g H \left(H^2 k^2+3\right)\right) H-5  $\left(32 \right) H^5 \left(H^2 k^2+3\right) U^3 k^4+3 \left(4 \right) H^5 \left(H^2 k^2+3\right)$  $U^3+39 \operatorname{sqrt}\{g^3 H^7 \operatorname{left}(H^2 k^2+3\operatorname{right})\} U\operatorname{right}(k^2+288 \operatorname{sqrt}\{g H \operatorname{left}(H^2 k^2+3\operatorname{right})\})$  $U^3\right) \left( \frac{4^2}{3}{384 \cdot qrt{g H} \left( \frac{^2 k^2+3\right)^{7/2}} + \frac{k^8 \left( \frac{3}{3} \right)^{7/2}}{2}} \right)$  $\left(H^2 k^2+3\right) -\left(H^2 k^2+3\right) -\left(H^2 k^2+3\right) U\right) U\right)$  $k^2+45$ right)  $H^2+g$  U \left(\sqrt{3} \left(149 H^4 k^4+930 H^2 k^2+1449\right) U-990 \sqrt{g H}  $\left(H^2 k^2+3\right) \ U^3 k^4+\left(H^2 k^2+3\right) \ U^3 k^4+\left(H^$  $k^2+360 \operatorname{ft}(H^2 k^2+3\operatorname{ht}) U^3\operatorname{ht}\right) \operatorname{text}(t^4)^4{128 \operatorname{tt}(H^2 k^2+3\operatorname{ht})} U^3\operatorname{ht}\right)$  $H^9 \left( H^2 k^2 + 3 \right) k^4 + 6 \left( H^2 k^2 + 3 \right) k^2 + 9 \left( H^2 k^2 +$  $k^2+3\right) \ U-3 \ gH \left(15 H^4 k^4+146 H^2 k^2+543\right) \ U-3 \ sqrt{3} gH \left(15 H^4 k^4+146 H^2 k^2+543\right) \ (30720 \ sqrt{gH})$ \left(H^2 k^2+3\right)^{5/2}}+\frac{i k^6 \left(128 \left(31 \sqrt{g H^{13} \left(H^2 k^2+3\right)} U^2 k^6+279 \sqrt{g H^9 \left(H^2 k^2+3\right)} U^2 k^4+27 \left(31 \sqrt{g H^5 \left(H^2 k^2+3\right)}  $U^2+7 \left( \frac{4^2 + 1}{4^2 + 1} \right) \left( \frac{4^2 + 3}{4^2 + 1} \right) \left( \frac{4^2 +$ U^2\right)-3 g H \left(1381 \sqrt{3} H^6 U k^6+\left(13717 \sqrt{3} H^4 U-960 \sqrt{g H^9 \left(H^2 k^2+3\right)\right) k^4+45735 \sqrt{3} H^2 U k^2+51039 \sqrt{3} U-18432 \sqrt{g H \left(H^2  $k^2+3\left(H^2 k^2+3\right)\right) \left(H^2 k^2+3\right) \left(H^2$ \sqrt{3} g^2 \left(775 H^4 k^4+6258 H^2 k^2+12999\right) H^2+g U \left(20551 \sqrt{3} H^6 U k^6-3 \left(12288 \sqrt{g H^9 \left(H^2 k^2+3\right)}-65021 \sqrt{3} H^4 U\right) k^4+617661 \sqrt{3} H^2 U k^2+81 \left(8053 \sqrt{3} U-5888 \sqrt{g H \left(H^2 k^2+3\right)\right)\right) H-128 \left(86  $\$  \\sqrt{g H^{13} \\left(H^2 k^2+3\right)} U^3 k^6+774 \\sqrt{g H^9 \\left(H^2 k^2+3\right)} U^3 k^4+9  $k^2+3\right)^{7/2}-\frac{i k^8 \left(U^3 \left(H^7776 \right)^{17} \left(H^2 k^2+3\right)}{U-21253}$  $\sqrt{3} g H^9\right/k^8-3 U\left(181 \right) sqrt{3} g^2 H^8+4 g U\left(181 \right) sqrt{3} U-5312 \right)$  $H \left( \frac{H^2 k^2+3\right)}{h^2 + 3 \cdot (H^2 k^2+3 \cdot$ \left(-31231 \sqrt{3} g^2 U H^6+2 g U^2 \left(34336 \sqrt{g H \left(H^2 k^2+3\right)}-67003 \sqrt{3}  $U + 5 + 288 \left( 162 \right) + 4^5 \left( 162 \right) + 4^5 \left( 164 \right) + 4^5$ k^2+3\right)\right)\right) k^4+27 \left(-35319 \sqrt{3} g^2 U H^4-91580 \sqrt{3} g U^3 H^3+64 \left(486 \sqrt{g H^5 \left(H^2 k^2+3\right)} U^4+1155 \sqrt{g^3 H^7 \left(H^2 k^2+3\right)} U^2+59  $\left(\frac{6^5 H^9 \left(\frac{4^2 k^2+3\right)}\right)}{k^2+243 \left(\frac{592 \sqrt{9} k^2+3 k^2+3\right)}}\right)$  $k^2+3\right)^{9/2}-\frac{h^2 k^2+3\left(h^2 k^2+3\right)^{-1}}{k^2+3\left(h^2 k^2+3\right)^{-1}}-\frac{h^2 k^2+3\left(h^2 k^2+3\right)^{-1}}{k^2+3\left(h^2 k^2+3\right)^{-1}}$  $U = U \cdot (42368 \cdot (4$ k^2+3\right)\right) H^7-169472 \sqrt{g H^{13} \left(H^2 k^2+3\right)} U^3\right) k^6+9 \left(-153703)  $\sqrt{3} g^2 U H^6+g U^2 \left(47651 \right) + \left(4^2 k^2+3\right) -700818 \right)$ TIAE - 254000 \- .....(- TIAO \1-0/TIAO 1-AO - 2\...; -1.D) TIAA - 7005 \- .....(- AS TIA(12) \1-0/TIAO 1-AO - 2\...; -1.D)\...; -1.D H^3+2342U8 \Sqrt{g} H^3\left(H^2 K^2+5\right)} \U^4+3\right(BCO) +4\*(15) \left(H^2 K^2+5\right) \U74+3\right(BCO) \Right(BCO) +3\right(BCO) \Right(BCO) \Right(BCO  $k^4 + 27 \left(-172047 \right) g^2 U H^4 - 477940 \right) g^2 U H^3 + 169472 \bigg) g^2 U H^3 - 169472 \bigg) g^2 U H^3 U H^3 - 169474 \bigg) g^2 U H^3 U H^3 - 169474 \bigg) g^2 U H^3 U H^3 - 169474 \bigg) g^2 U H^3 U H^3 - 16947$  $k^2+3\right) U^4+372075 \left( 4^2 k^2+3\right) U^2+18078 \left( 4^2 k^2+3\right) U^2+18078$  $k^2+3\right) \ k^2+3 \ k^$ \sqrt{g H \left(H^2 k^2+3\right)}-122207 \sqrt{3} U\right) U^2-63917 \sqrt{3} g^2 H^2 U+11603  $\$  \sqrt{g^5 H^5 \left(H^2 k^2+3\right)\right)\right) \text{dt}^4\{92160 \left(\sqrt{g H} \left(H^2 k^2+3\right)\right)\right)} 

Out[261]=

$$\begin{aligned} & \text{Out}[262] = & \text{ EA } || & \left. \left\{ \left\{ 1 + \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, \text{w}} \right) \, \text{H}^2 \, \text{k}^3 \, \text{U} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{6 + 2 \, \text{H}^2 \, \text{k}^2 \right) \, \text{w}}, \, \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, \text{w}} \right) \, \text{H} \, \text{K} \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{2 \left( \text{H} + \frac{\text{H}^3 \, k^2}{3} \right) \, \text{w}} \right\}, \\ & \left\{ \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, \text{w}} \right) \, k \left( g \, \text{H} \, \left( 3 + \text{H}^2 \, \, k^2 \right) - 3 \, \text{U}^2 \right) \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{2} \right\}, \, 1 \, + \, \frac{i \, e^{\frac{i \, \text{dx} \, k}{2}} \left( 1 - e^{-i \, \text{dx} \, k} \right) \left( -1 + e^{i \, \text{dt} \, \text{w}} \right) \, k \left( 6 + \text{H}^2 \, \, k^2 \right) \, \text{U} \, \, \text{Csc} \left[ \frac{\text{dx} \, k}{2} \right]}{\left( 6 + 2 \, \text{H}^2 \, \, k^2 \right) \, \text{w}} \right\} \right\} \end{aligned}$$

Out[263]= EA || \left(

\begin{array}{cc}

 $\frac{i e^{\frac{i -e^{-i text}dx}{k}} \left(1-e^{-i text}dx\right) k}{2}} \left(1-e^{-i text}dx\right) k}{i -e^{-i text}dx} k}{i -e^{-i text}dx}$ w\right) H^2 U \csc \left(\frac{\text{dx} k}{2}\right) k^3}{\left(2 H^2 k^2+6\right) w}+1 &  $\frac{i e^{\frac{i -e^{i \cdot k}}{dx} k}}{2}} \left(1-e^{-i \cdot k} \right) \left(1-e^{-i$  $w\} \text{ w} \text{ } H \text{ } \text{ } k \text{ } k$ 

 $\label{eq:linear_energy} $$ \frac{i \cdot x_{dx} k}{2}} \left(1-e^{-i \cdot x_{dx} k}\right) \left(1 \left(H^2 k^2+3\right)-3 U^2\right) \cos \left(\frac{4x}{k}^2\right) \left(H^2 k^2+6\right)$ w \\frac\{i e^{\frac\{i \text\{dx\} k\\\frac\{i \text\{dx\} k\\\right\}\\left(-1+e^\{i \text\{dx\} w\\\right\}\\right)}  $k \left( H^2 k^2 + 6 \right) U \left( \frac{4k}{2} \right) \left( H^2 k^2 + 6 \right) W + 1$ 

\end{array}

\right)

$$\left\{ \left\{ \left( -\frac{\left( H^2 k^3 U w \right) dt^2}{2 \left( 3 + H^2 k^2 \right)} - \frac{i H^2 k^3 U w^2 dt^3}{6 \left( 3 + H^2 k^2 \right)} + \frac{H^2 k^3 U w^3 dt^4}{24 \left( 3 + H^2 k^2 \right)} + O[dt]^5 \right) + \left( \frac{1}{2} k^2 U dt + O[dt]^5 \right) dx + \left( \frac{i \left( 9 H^2 k^5 + 2 H^4 k^7 \right) U dt}{12 \left( 3 + H^2 k^2 \right)^2} + O[dt]^5 \right) dx^2 + \left( -\frac{1}{24} \left( k^4 U \right) dt + O[dt]^5 \right) dx^3 + \left( -\frac{i k^7 \left( 54 H^2 U + 19 H^4 k^2 U + 2 H^6 k^4 U \right) dt}{240 \left( 3 + H^2 k^2 \right)^3} + O[dt]^5 \right) dx^4 + O[dx]^5,$$

Out[264]= Eerr |

$$\left( -\frac{1}{24} \left( k^4 \, U \right) dt + O[dt]^5 \right) dx^3 + \left( -\frac{i \, k^7 \, (54 \, H^2 \, U + 19 \, H^4 \, k^2 \, U + 2 \, H^6 \, k^4 \, U \right) dt}{240 \, (3 + H^2 \, k^2)^3} + O[dt]^5 \right) dx^4 + O[dx]^5,$$

$$\left( -\frac{3 \, (k \, w) \, dt^2}{2 \, (3 + H^2 \, k^2)} - \frac{i \, k \, w^2 \, dt^3}{2 \, (3 + H^2 \, k^2)} + \frac{k \, w^3 \, dt^4}{8 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) + \left( \frac{i \, (6 \, k^3 + H^2 \, k^3) \, dt}{4 \, (3 + H^2 \, k^2)^2} + O[dt]^5 \right) dx^2 + \left( \frac{i \, (-54 \, k^5 + H^4 \, k^9) \, dt}{240 \, (3 + H^2 \, k^2)^3} + O[dt]^5 \right) dx^4 + O[dt]^5,$$

$$O[dx]^5 \right\}, \\ \left\{ \left( -\frac{\left( k \, (3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2 \right) w \right) dt^2}{2 \, (3 + H^2 \, k^2)} - \frac{i \, k \, (3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2 \right) w^2 \, dt^3}{6 \, (3 + H^2 \, k^2)} + \frac{k \, (3 \, g \, H + g \, H^3 \, k^2 - 3 \, U^2 \right) w^3 \, dt^4}{24 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) + \left( \frac{1}{2} \, g \, H \, k^2 \, dt + O[dt]^5 \right) dx^3 + \left( \frac{i \, (18 \, g \, H \, k^3 + 12 \, g \, H^3 \, k^3 + 2 \, g \, H^3 \, k^7 - 18 \, k^3 \, U^2 - 3 \, H^2 \, k^5 \, U^2 \right) dt}{12 \, (3 + H^2 \, k^2)^2} + O[dt]^5 \right) dx^2 + \left( -\frac{1}{24} \, \left( g \, H \, k^4 \right) \, dt + O[dt]^5 \right) dx^3 + \left( -\frac{i \, (54 \, g \, H \, k^5 + 54 \, g \, H^3 \, k^7 + 18 \, g \, H^5 \, k^9 + 2 \, g \, H^7 \, k^{11} - 54 \, k^5 \, U^2 + H^4 \, k^9 \, U^2 \right) dt}{240 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) dx^4 + O[dx]^5,$$

$$\left( -\frac{\left( k \, (6 + H^2 \, k^2) \, U \, w \right) \, dt^2}{2 \, (3 + H^2 \, k^2)} - \frac{i \, k \, (6 + H^2 \, k^2) \, U \, w^3 \, dt^4}{6 \, (3 + H^2 \, k^2)} + \frac{k \, (6 + H^2 \, k^2) \, U \, w^3 \, dt^4}{24 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) + \left( \frac{1}{2} \, k^2 \, U \, dt + O[dt]^5 \right) dx^4 + O[dt]^5,$$

$$\left( -\frac{\left( i \, (36 \, k^3 + 15 \, H^2 \, k^3 + 2 \, H^4 \, k^7 \right) \, U \, dt}{6 \, (3 + H^2 \, k^2)} + O[dt]^5 \right) dx^2 + \left( -\frac{1}{24} \, \left( k^4 \, U \right) \, dt + O[dt]^5 \right) dx^3 + \left( -\frac{i \, (108 \, k^5 + 54 \, H^2 \, k^7 + 17 \, H^4 \, k^9 + 2 \, H^6 \, k^{11} \right) \, U \, dt}{240 \, (3 + H^2 \, k^2)^3} + O[dt]^5 \right) dx^4 + O[dt]$$

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Out[265]= Eerr || \left(
        \begin{array}{cc}
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\left(-\frac{h^2 k^3 U w\right) \left(t^2 k^3 U w\right) \left(t^2 k^2 + 3\right) - \frac{h^2 k^3 U w\right)}{h^2 k^3 U w\right) + \frac{h^2 k^3 U w}{h^2 k^3 U w}
                                                                                       k^2+3\left(\frac{dt}{5\right)}+O\left(\frac{dt}{5\right)}+O\left(\frac{1}{2} k^2 U \cdot \frac{dt}{+0}\right)
                                                                                       \text{text}\{dx\}+\text{left}(\frac{1}{2} H^4 k^7+9 H^2 k^5\right) U \text{ text}\{dt\}\{12 \left(H^2 \right)
                                                                                       \label{eq:continuity} $$ k^2+3\right)^2}+O\left(\frac{dt}^5\right)^3\right) \text{dx}^2+\left(-\frac{1}{24}\left(\frac{4}{V}\right)^2\right)^2}
                                                                                       \label{eq:left-condition} $$ \operatorname{d}_0^3+\left(-\frac{i k^7 \left(2 k^4 U H^6+19 k^2 H^6+1
                                                                                       \text{dx}^4+O\left(\frac{dx}^5\right) & \left(-\frac{3 (k w) \text{d}^2}{2 \left(\frac{H^2}{2}\right)} \right)
                                                                                       \label{left} $$ k^2+3\right)-\frac{k^2}{2 \left( k^2+3\right)}-\frac{k^2}{2 \left( k^2+3\right)}+\frac{k^2}{2 \left( k^2+3\right)}+\frac{k^
                                                                                       \label{left(H^2 k^5+6 k^3 right)} + O\left(\frac{dt}{5}\right) + \left(\frac{dt}{5}\right) + \left(\frac{dt}{5}\right)
                                                                                       k^2+3\right)^2+O\left(\frac{t}{5\right)}\right)
                                                                                       \t (text{dt}^2 40 \left( \frac{A^2 + 3\right)^3}{-0} \left( text{dt}^5\right) \right) \\
        \label{left} $\left(-\frac{k^2 H^3+3 g H-3 U^2\right) w\right) \operatorname{left}(h^2 k^2+3\right)^{-\frac{1}{2}} (h^2 k^2+3\right)^{-\frac{1}{2}} \left(-\frac{k^2 H^3+3 g H-3 U^2\right) \left(-\frac{k^2 H^3+3 g H-3 U^2\right)^{-\frac{1}{2}} (h^2 k^2+3)^{-\frac{1}{2}} (h^2 k^2+3)^{-\frac{
                                                                                       \label{left} $$\left(g \ k^2 \ H^3 + 3 \ g \ H - 3 \ U^2\right) \ w^2 \ k^2 \ h^3 + 6 \ \left(H^2 \ k^2 + 3\right) + \frac{k \left(k \ k^2 \ H^3 + 3 \ g \ h^2 + 3\right)}{k^2 \ h^3 + 3 \ g \ h^3 + 3 \ h^3 + 3 \ g \ h^3 + 3 \ h^3 + 3 \ g \ h^3 + 3 
                                                                                       H-3 U^2\right) w^3 \text{-} 24\left(\frac{dt}^4}{24\left(\frac{H^2 k^2+3\right)}{+O\left(\frac{dt}^4\right)}} + O\left(\frac{dt}^4\right) + O\left(\frac{dt}^4
                                                                                       g H k^2 \text{dt}+O\left(\frac{dt}^5\right)\right) \cdot \left(\frac{dx}+\left(\frac{dx}+\right)\right)
                                                                                       k^7+12 g H^3 k^5-3 H^2 U^2 k^5-18 U^2 k^3+18 g H k^3 \right) \left( H^2 U^2 k^5-18 U^2 k^3+18 g H k^3 \right) \left( H^2 U^2 k^5-18 U^2 k^5-18 U^2 k^3+18 g H k^3 \right) \left( H^2 U^2 k^5-18 U^2 k^5-18 U^2 k^3+18 g H k^3 \right) \left( H^2 U^2 k^5-18 U^2 k^5-18 U^2 k^5-18 U^2 k^5-18 U^2 k^3+18 g H k^3 \right) \left( H^2 U^2 k^5-18 U^2 k^
                                                                                       k^2+3\right)^2+O\left(\frac{dt}^5\right) \cdot \left(\frac{dt}^2+\left(\frac{dt}^2\right)^2\right)
                                                                                       \text{text}\{dt\}+O\left(\frac{dt}^5\right)\right) \cdot \left(\frac{dx}^3+\left(\frac{dx}^3+\frac{1}{2}\right)\right)
                                                                                       H^5 k^9+H^4 U^2 k^9+54 g H^3 k^7-54 U^2 k^5+54 g H k^5\right) \text{dt}{{240 \left(H^2)}
                                                                                       k^2+3\left(\frac{dx}^4+O\left(\frac{dx}^5\right)\right) \ \& \ (x^2+3\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left(\frac{dx}^5\right)^3+O\left
                                                                                       \left(-\frac{h^2 k^2+6\right} U \right) \le \left(-\frac{h^2 k^2+6\right} U \right) \le \left(-\frac{h^2 k^2+3\right} \left(-\frac{h^2 k^2+3\right} \right) - \frac{h^2 k^2+3} \left(-\frac{h^2 k^2+3\right} \left(-\frac{h^2 k^2+3\right} \left(-\frac{h^2 k^2+3\right} \right) - \frac{h^2 k^2+3} \left(-\frac{h^2 k^2+3\right} \left(-\frac{h^2 k^2+3\right} \left(-\frac{h^2 k^2+3\right)} \left(-\frac{h^2 k^2+3\right} \left(-\frac{h^2 k^2+3\right)} \left(-\frac{h^2 k^2+3\right)
                                                                                       \left(H^2 k^2+6\right) U w^2 \left(dt^3\right) \left(h^2 k^2+3\right) + \frac{k^2+6\left(H^2 k^2+6\right)}{h^2 k^2+6\right) 
                                                                                       U w^3 \text{$text{dt}^4}{24 \left(\frac{H^2 k^2+3\right)}+O\left(\frac{dt}{5}\right)\right)} + O\left(\frac{dt}{5}\right) + 
                                                                                       k^2 U \text{text}dt}+O\left(\frac{dt}{5}\right)\right) \text{text}dt}+\left(\frac{dt}{5}\right) \text{text}dt}+\left(\frac{dt}{5}\right) \text{text}dt}+\left(\frac{dt}{5}\right) \text{text}dt}
                                                                                       k^5+36 k^3\right) U \text{ } (h^2 k^2+3\right) + O\left(\frac{dt}{5}\right) U \text{ } (h^2 k^2+3\right)
                                                                                       \text{dx}^2+\left(\frac{1}{24}\right) \cdot \left(\frac{4t}{-5\right)}
                                                                                       \text{text}\{dx\}^3 + \text{left}(-\frac{1}{2} A^6 k^{11} + 17 A^4 k^9 + 54 A^7 + 108 k^5 + 108 k^5 + 108 k^6 + 118 A^7 + 108 k^6 + 108 k^
                                                                                       \left(\frac{dt}^5 \right) \cdot \left(\frac{
  \end{array}
\right)
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In[266]:=