```
$Assumptions = dt^2 == 0 && dt * dW == 0 && dW^2 == dt && S > 0 && M > 0 && s > 0;

dS = r S dt + s S dW;
dP = r (P - q S) dt + q dS;
 dDX = Δ dS - r Δ S dt;

dDV = Expand[Simplify[
     Normal[Series[V[a, b, c], {a, S, 2}, {b, P, 2}, {c, t, 1}]] - V[S, P, t]
          - r V[S, P, t] dt /. a → S + dS /. b → P + dP /. c → t + dt
   ]];

HR = Δ /. Solve[dDX == dDV /. dt → 0, Δ][[1, 1]]
FKE = Expand[dDV - dDX /. dW → 0 /. dt → 1]
```

$$q\,V^{(0,1,0)}[S, P, t] + V^{(1,0,0)}[S, P, t]$$

$$-r\,V[S, P, t] + V^{(0,0,1)}[S, P, t] + P\,r\,V^{(0,1,0)}[S, P, t] + \frac{1}{2}\,q^2\,s^2\,S^2\,V^{(0,2,0)}[S, P, t] +$$

$$r\,S\,V^{(1,0,0)}[S, P, t] + q\,s^2\,S^2\,V^{(1,1,0)}[S, P, t] + \frac{1}{2}\,s^2\,S^2\,V^{(2,0,0)}[S, P, t]$$

Simularity reduction

```
Vr[S_, P_, t_] := S H[P / S, t];(*P=e*S*)

FKE2 = Simplify[Simplify[(FKE /. V → Vr /. P → e * S) == 0][[1]] / 2]
```

$$\frac{1}{2}\left(2\,H^{(0,1)}[e, t] + (e - q)^2\,s^2\,H^{(2,0)}[e, t]\right)$$