

سپس برای جت خواهیم داشت:

پایستگی جرم:

$$\frac{\partial V^z}{\partial z} = (z^{3/2} + Kz^{5/2})^{-1} \left\{ - \left( \frac{3}{z^2} + K \frac{5}{z^2} \right) [-\{\Gamma_{\varphi z}^0 V^z V^\varphi + \Gamma_{z\varphi}^0 V^\varphi V^z\}] - \frac{1}{(u^0)^2} [-2\{-B_z J^R u^\varphi u^0\}] \right. \\ \left. - V^z \frac{\partial}{\partial z} (z^{3/2} - Kz^{5/2}) \right\}$$



پایستگی تکانه زاویه ای:

$$\frac{\partial V^\varphi}{\partial z} = [(z^{3/2} + Kz^{5/2})(u^0)^2 V^z]^{-1} [-(z^{3/2} + Kz^{5/2})(u^0)^2 [2V^z (\Gamma_{tz}^\varphi - \Gamma_{tz}^t V^\varphi) + V^\varphi V^z (\Gamma_{z\varphi}^\varphi - \Gamma_{z\varphi}^t V^\varphi) \\ + V^z V^\varphi (\Gamma_{\varphi z}^\varphi - \Gamma_{\varphi z}^t V^\varphi)] - B_z J^R]$$



پایستگی تکانه شعاعی نتیجه می دهد:

$$B_z = (J^\varphi)^{-1} \left\{ \frac{5}{2} \left[ 1 + \frac{2m}{z} \right] Kz^{3/2} + (z^{3/2} + Kz^{5/2})(u^0)^2 [(\Gamma_{00}^R) + 2V^\varphi \Gamma_{0\varphi}^R + V^\varphi V^\varphi \Gamma_{\varphi\varphi}^R + V^z V^z \Gamma_{zz}^R] \right\}$$



از پایستگی تکانه ارتفاعی:

$$\frac{\partial V^z}{\partial z} = [(z^{3/2} + Kz^{5/2})(u^0)^2 V^z]^{-1} \left\{ - \left[ 1 + \frac{2m}{z} \right] \frac{\partial (Kz^{5/2})}{\partial z} \right. \\ \left. - (z^{3/2} + Kz^{5/2})(u^0)^2 [\Gamma_{tt}^z + 2V^\varphi \Gamma_{t\varphi}^z - 2\Gamma_{tz}^t V^z V^z + V^\varphi V^\varphi \Gamma_{\varphi\varphi}^z - \Gamma_{z\varphi}^t V^z V^\varphi V^z - \Gamma_{\varphi z}^t V^z V^z V^\varphi \right. \\ \left. + V^z V^z \Gamma_{zz}^z] \right\}$$

و ترکیب با پایستگی جرم (چون دوتا معادله برای  $\frac{\partial V^z}{\partial z}$  به دست آمده) به این نتیجه می رسیم:

$$B_\varphi = \left( -\frac{1}{4\pi} \left\{ \frac{\partial}{\partial z} \left[ -\frac{z^2}{(z^2 + 2m)^2} \right] \right. \right. \\ \left. + \left( -\frac{mz(z + 2z^3 + z^5 - 2m + 6a^2m - 4mz^2 - 2mz^4)}{(1 - 4m^2 + 3z^2 + 4a^2m^2 - 8m^2z^2 + 3z^4 - 4m^2z^4 + z^6)} - \frac{m}{z(z + 2m)} \right. \right. \\ \left. \left. - \frac{mz}{(1 + z^2)(\sqrt{z} + 2m)} \right) \left( -\frac{z^2}{(z^2 + 2m)^2} \right) \right\}^{-1} (B_z u^\varphi u^0)^{-1} \left[ -\frac{(u^0)^2}{2} \left\{ \left( \frac{3}{z^2} \right. \right. \right. \\ \left. \left. + Kz^{\frac{5}{2}} \right) [-\{\Gamma_{\varphi z}^0 V^z V^\varphi + \Gamma_{z\varphi}^0 V^\varphi V^z\}] + V^z \frac{\partial}{\partial z} (z^{\frac{3}{2}} - Kz^{\frac{5}{2}}) \right\} \right. \\ \left. - \frac{\left( \frac{3}{z^2} + Kz^{\frac{5}{2}} \right)}{2 \left( \frac{3}{z^2} + Kz^{\frac{5}{2}} \right) V^z} \left\{ - \left[ 1 + \frac{2m}{z} \right] \frac{\partial (Kz^{5/2})}{\partial z} \right. \right. \\ \left. \left. - (z^{3/2} + Kz^{5/2})(u^0)^2 [\Gamma_{tt}^z + 2V^\varphi \Gamma_{t\varphi}^z - 2\Gamma_{tz}^t V^z V^z + V^\varphi V^\varphi \Gamma_{\varphi\varphi}^z - \Gamma_{z\varphi}^t V^z V^\varphi V^z - \Gamma_{\varphi z}^t V^z V^z V^\varphi \right. \right. \\ \left. \left. + V^z V^z \Gamma_{zz}^z] \right\} \right]$$

حالا مشکل اینجاست که برای مولفه های  $B$  رابطه مشتقی نداریم!

همینطور برای  $J$  در جت داریم (تنها آن هایی که استفاده دارند را نوشتیم):

$$\begin{aligned}
 -\frac{4\pi}{c}J^R &= B_\varphi \left\{ \frac{\partial}{\partial z} \left[ -\frac{z^2}{(z^2+2m)^2} \right] \right. \\
 &\quad + \left( -\frac{mz(z+2z^3+z^5-2m+6a^2m-4mz^2-2mz^4)}{(1-4m^2+3z^2+4a^2m^2-8m^2z^2+3z^4-4m^2z^4+z^6)} - \frac{m}{z(z+2m)} \right. \\
 &\quad \left. \left. - \frac{mz}{(1+z^2)(\sqrt{z}+2m)} \right) \left( -\frac{z^2}{(z^2+2m)^2} \right) \right\} \\
 -\frac{4\pi}{c}J^\varphi &= -B_z \left\{ \frac{am(z-2z^3+4mz^2)}{(1-4m^2+3z^2+4a^2m^2-8m^2z^2+3z^4-4m^2z^4+z^6)} \left( \frac{z^4}{2ma(z+2m)} \right) \right. \\
 &\quad + \left( -\frac{m}{z^2(z+2m)} - (2mz^3+4z^5m+2z^7m-mz-4z^3m-5z^5m-2z^7m-1 \right. \\
 &\quad + 2m^2-4z^2+2a^2m^2+8m^2z^2-6z^4-4a^2m^2z^2+10m^2z^4-4z^6+4m^2z^6 \\
 &\quad \left. - z^8)/((1+z^2)(1-4m^2+3z^2+4a^2m^2-8m^2z^2+3z^4-4m^2z^4+z^6)) \right. \\
 &\quad \left. - \frac{m}{(1+z^2)(z+2m)} \right) \left( \frac{z^2}{(z+2m)^2} \right) \Big\}
 \end{aligned}$$

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