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Abstract

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$$\begin{aligned} \frac{dp_0^*}{dr} = & \underbrace{-\frac{m_0(1+8\pi r^2 p)}{(r-2m)^2}}_{one} - \underbrace{\frac{4\pi r^2(\epsilon+p)}{r-2m} \left(1 - \frac{\sigma}{\epsilon+p}\right)}_{two} p_0^* + \underbrace{\frac{1}{12} \frac{r^4 j^2}{r-2m} \left(\frac{d\bar{\omega}}{dr}\right)^2}_{three} \\ & + \underbrace{\frac{1}{3} \frac{d}{dr} \left(\frac{r^3 j^2 \bar{\omega}^2}{r-2m}\right)}_{four}. \end{aligned} \quad (1)$$

Note: Suku 'four' setelah diturunkan terhadap r menjadi

$$\frac{1}{3} \frac{\left[3r^2 j^2 \bar{\omega}^2 + 2r^3 \bar{\omega}^2 j \frac{dj}{dr} + 2r^3 j^2 \bar{\omega} \frac{d\bar{\omega}}{dr}\right] - [(r^3 j^2 \bar{\omega}^2)(1 - 2\frac{dm}{dr})]}{(r-2m)^2} \quad (2)$$

$$\begin{aligned} \frac{dm_0}{dr} = & \underbrace{4\pi r^2 \frac{d\epsilon}{dp} \left(1 - \frac{d\sigma}{dp}\right)^{-1} (\epsilon+p) \left(1 - \frac{\sigma}{\epsilon+p}\right)}_{five} p_0^* + \underbrace{\frac{1}{12} j^2 r^4 \left(\frac{d\bar{\omega}}{dr}\right)^2}_{six} \\ & - \underbrace{\frac{1}{3} r^3 \left(\frac{dj^2}{dr}\right) \bar{\omega}^2 \left(1 - \frac{\sigma}{\epsilon+p}\right)}_{seven}, \end{aligned} \quad (3)$$

$$\begin{aligned} \frac{dh_2}{dr} = & \underbrace{\left[-\frac{d\nu}{dr} + \frac{r}{r-2m} \left(\frac{d\nu}{dr}\right)^{-1} \left\{8\pi(\epsilon+p) \left(1 - \frac{\sigma}{\epsilon+p}\right) \left(1 - \frac{d\sigma}{dp}\right)^{-1} - \frac{4m}{r^3}\right\}\right]}_{eight} \\ & \underbrace{\times h_2}_{(lanjutan)eight} - \underbrace{\frac{4v_2}{r(r-2m)} \left(\frac{d\nu}{dr}\right)^{-1}}_{mnine} + \underbrace{\frac{1}{6} \left[\frac{1}{2} \frac{d\nu}{dr} r - \frac{1}{r-2m} \left(\frac{d\nu}{dr}\right)^{-1}\right] r^3 j^2 \left(\frac{d\bar{\omega}}{dr}\right)^2}_{ten} \end{aligned}$$

$$\begin{aligned}
& \underbrace{-\frac{1}{3} \left[\left(1 - \frac{6\sigma}{\epsilon + p}\right) \frac{1}{2} \frac{d\nu}{dr} r + \frac{1}{r - 2m} \left(\frac{d\nu}{dr}\right)^{-1} \left(1 - \frac{\sigma}{\epsilon + p}\right) \left(1 - \frac{d\sigma}{dp}\right) \right]}_{eleven} \\
& \times \underbrace{r^2 \left(\frac{dj^2}{dr}\right) \bar{\omega}^2}_{(lanjutan)eleven}.
\end{aligned} \tag{4}$$

$$\frac{dv_2}{dr} = -\frac{d\nu}{dr} h_2 + \left(\frac{1}{r} + \frac{1}{2} \frac{d\nu}{dr}\right) \left[-\left(\frac{1}{3} - \frac{2\sigma}{\epsilon + p}\right) r^3 \frac{dj^2}{dr} \bar{\omega}^2 + \frac{1}{6} j^2 r^4 \left(\frac{d\bar{\omega}}{dr}\right)^2 \right], \tag{5}$$

Suku-suku "bermasalah": four, mnine, dan ten. Namun dengan menghilangkan suku-suku bermasalah ini juga nilai deformasi yang diperoleh (di code dilabeli sebagai X) masih sangat besar.

Persamaan-persamaan pendukung:

$$j = e^{-\nu} \left[1 - \frac{2m(r)}{r} \right]^{1/2} \tag{6}$$

$$j^2 = e^{-2\nu} \left[1 - \frac{2m(r)}{r} \right] \tag{7}$$

$$\frac{dj}{dr} = -4\pi r(\epsilon + p) e^{-\nu} \left[1 - \frac{2m(r)}{r} \right]^{-1/2} \tag{8}$$

$$\frac{dj^2}{dr} - 8\pi r e^{-2\nu} (\epsilon + p) \tag{9}$$

$$\frac{d\nu}{dr} = \frac{8\pi p r^3 + 2m}{r(r - 2m)} \tag{10}$$

$$p_2^* = -h_2 - \frac{1}{3} r^2 e^{-2\nu} \bar{\omega}^2 \tag{11}$$