

Wigglewave equations

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August 31, 2021

$$\rho \frac{\partial v}{\partial t} = \frac{1}{r\mu_0} (\mathbf{B}_0 \cdot \nabla(rb)) + \frac{1}{r} \frac{\partial}{\partial r} \left(\rho \nu r \frac{\partial v}{\partial r} \right) + \frac{\partial}{\partial z} \left(\rho \nu \frac{\partial v}{\partial z} \right)$$

$$\frac{\partial b}{\partial t} = r \mathbf{B}_0 \cdot \nabla \left(\frac{v}{r} \right)$$

Expanded this is equal to:

$$\frac{\partial v}{\partial t} = \frac{1}{\mu_0 \rho} \left(B_r \frac{\partial b}{\partial r} + B_z \frac{\partial b}{\partial z} + \frac{B_r b}{r} \right) + \frac{1}{r\rho} \frac{\partial}{\partial r} \left(\rho \nu r \frac{\partial v}{\partial r} \right) + \frac{1}{\rho} \frac{\partial}{\partial z} \left(\rho \nu \frac{\partial v}{\partial z} \right)$$

$$\frac{\partial b}{\partial t} = B_r \frac{\partial v}{\partial r} + B_z \frac{\partial v}{\partial z} - \frac{v B_r}{r}$$