

Magnetic fields in Astrophysics

Daniel James Price

ERRATA (TEN YEARS LATER)

- Equation (3.15) has incorrect sign, should read

$$\nabla A = \frac{1}{\rho} [\nabla(\rho A) - A \nabla \rho] \quad (3.15)$$

- Equation (3.23) has incorrect sign, should read

$$(\nabla \times \mathbf{v})_a \approx \frac{1}{\rho_a} \sum_b m_b (\mathbf{v}_a - \mathbf{v}_b) \times \nabla_a W_{ab}. \quad (3.23)$$

- Equation (3.49) has incorrect sign, should read

$$\frac{\partial L}{\partial \mathbf{r}_a} = - \sum_b m_b \left. \frac{\partial u_b}{\partial \rho_b} \right|_s \frac{\partial \rho_b}{\partial \mathbf{r}_a}. \quad (3.49)$$

- Equation (3.52)-(3.53) have incorrect signs, should read

$$\frac{\partial L}{\partial \mathbf{r}_a} = - \sum_b m_b \frac{P_b}{\rho_b^2} \sum_c m_c \nabla_a W_{bc} (\delta_{ba} - \delta_{ca}), \quad (3.52)$$

$$= -m_a \sum_b m_b \left(\frac{P_a}{\rho_a^2} + \frac{P_b}{\rho_b^2} \right) \nabla_a W_{ab}, \quad (3.53)$$

- Equation (3.56) and the preceding line have incorrect signs, should read

$$\frac{d}{dt} \sum_a \mathbf{r}_a \times m_a \mathbf{v}_a = \sum_a m_a \left(\mathbf{r}_a \times \frac{d\mathbf{v}_a}{dt} \right), \quad (3.55)$$

$$= - \sum_a \sum_b m_a m_b \left(\frac{P_a}{\rho_a^2} + \frac{P_b}{\rho_b^2} \right) \mathbf{r}_a \times (\mathbf{r}_a - \mathbf{r}_b) F_{ab},$$
$$= \sum_a \sum_b m_a m_b \left(\frac{P_a}{\rho_a^2} + \frac{P_b}{\rho_b^2} \right) \mathbf{r}_a \times \mathbf{r}_b F_{ab}. \quad (3.56)$$

- Equation (3.62) has incorrect sign, should read

$$\frac{dE}{dt} = \sum_a m_a \frac{de_a}{dt} = - \sum_a \sum_b m_a m_b \left(\frac{P_a}{\rho_a^2} \mathbf{v}_b + \frac{P_b}{\rho_b^2} \mathbf{v}_a \right) \cdot \nabla_a W_{ab}, \quad (3.62)$$

- Equation (3.63) has incorrect sign, should read

$$\frac{de_a}{dt} = - \sum_b m_b \left(\frac{P_a}{\rho_a^2} \mathbf{v}_b + \frac{P_b}{\rho_b^2} \mathbf{v}_a \right) \cdot \nabla_a W_{ab}. \quad (3.63)$$

What's a few minus signs between friends? I hope nobody has died as a result.
Let me know if you have spotted any others.

DJP, Feb 2014