

Astronomie II

Beispiel 37

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Zeitliche Metallizitätsentwicklung :

$$\begin{aligned} Z' &= \left(\frac{M_z}{M_g} \right)' = \\ &= \frac{M_z' M_g - M_z M_g'}{M_g^2} = \\ &= \frac{\frac{dM_z}{dM_s} M_s' M_g - M_z M_g'}{M_g^2} = \\ &= \frac{(y - Z) \frac{dM_s}{dt} M_g - M_z M_g'}{M_g^2} \approx \\ &\approx \frac{(y - \frac{M_z}{M_g}) (\frac{-dM_g}{dt}) M_g - M_z M_g'}{M_g^2} = \\ &= -y \frac{M_g'}{M_g} + \frac{M_z M_g'}{M_g^2} - \frac{M_z M_g'}{M_g^2} = \\ &= -y (\log M_g)' \end{aligned}$$

Integration über t :

$$Z = -y \log M_g + C$$

Setze $C = Z(0) + y \log M_g(0)$:

$$Z(t) = Z(0) - y \log \frac{M_g(t)}{M_g(0)}$$