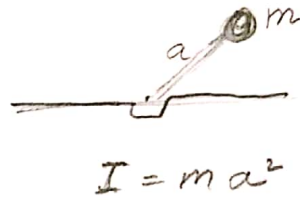


4016



$$H = \frac{p_\theta^2}{2I} + \frac{p_\phi^2}{2I \sin^2 \theta} - \xi a \cos \theta$$

$$Z_{\perp} = \frac{I}{2\pi\beta} \iint d\theta d\phi e^{\beta \xi a \cos \theta}$$

See Ex 2173

For perp. Field $Z_{\perp} = \frac{I}{\beta} \frac{e^{\beta \xi a} - 1}{\beta \xi a}$

For parallel $Z_{\parallel} = \frac{I}{\beta} \sinh(\beta \xi a)$

$$Z(\beta, \mu, \xi) = [1 + Z_1(\beta, \xi) e^{\beta \mu}]^M$$

$$N = \frac{1}{\beta} \frac{\partial \ln Z}{\partial \mu} = \frac{M}{1 + (1/Z_1) e^{-\beta \mu}}$$

$$D = \frac{1}{\beta} \frac{\partial \ln Z}{\partial \xi} = N \cdot \frac{1}{\beta} \frac{\partial \ln Z_1}{\partial \xi}$$

$$N = \frac{M}{1 + (ma^2 \beta)^{-1} e^{-\mu/\beta}} \quad (\xi \rightarrow 0)$$

$$D(\xi) \approx N \cdot \left[\frac{1}{2} a - \frac{1}{3} \frac{a^2}{\beta} \xi \right]$$

$$Z_{\perp}^{\perp} \approx 1 + \frac{1}{2} (\beta \xi a)$$

$$Z_{\parallel}^{\parallel} \approx 1 + \frac{1}{6} (\beta \xi a)^2$$