

Level 2 EMQ4 2002/3

A thin disk of thickness t and radius R has uniform magnetisation, M , in the direction of its axis. What is the form of the associated volume and surface magnetisation current densities?

Use the standard Biot-Savart expression

$$\underline{B} = \frac{\mu_0 I}{4\pi} \int \frac{d\underline{l} \times \underline{\hat{r}}}{r^2}$$

together with a reasonable approximation to obtain the following result for the axial magnetic field at a long distance, L , along the axis of the disk:

$$B = \frac{\mu_0 M t R^2}{2(L^2 + R^2)^{3/2}}$$