H22

Po 2

(1)

$$\cos\theta = \frac{a}{\sqrt{a^2+d^2}}$$
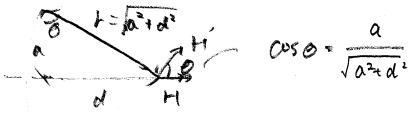
$$H = \int_0^{2\pi a} \frac{I}{4\pi(a^2+d^2)} dl \cdot \cos\theta$$

$$= \frac{a^2 I}{2(a^2+d^2)^{\frac{3}{2}}}$$

(2)

$$\bar{\Phi}_{21} = B \cdot S = \mu_0 H S$$

$$= \frac{\mu_0 a^2 I}{2(a^2+d^2)^{\frac{3}{2}}} \cdot b^2\pi$$

(3)

$$M = \frac{\Phi_{21}}{I} = \frac{\mu_0 a^2 b^2 \pi}{2(a^2+d^2)^{\frac{3}{2}}}$$

(4)

$$H = \frac{b^2 I}{2(b^2+d^2)^{\frac{3}{2}}}$$

$$\bar{\Phi}_{12} = \frac{\mu_0 a^2 b^2 I \pi}{2(b^2+d^2)^{\frac{3}{2}}}$$

(5)

$$F = \frac{\partial M}{\partial d} I_1 I_2$$

$$F$$