作业 4

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13-1

空气：

$$I = \frac{B}{\mu_0 n} = \frac{4.2 \times 10^{-4}}{4\pi \times 10^{-7} \times 1000} = 0.33A$$

铁芯：

$$B' = \mu_r B = 5000 \times 4.2 \times 10^{-4} = 2.1T$$

13-2

(1)

$$I = 2\pi R_1 H_c = 2\pi \times 5 \times 10^{-4} \times \frac{500}{\pi} = 0.5A$$

(2)

$$I = 2\pi R_2 H_c = 2\pi \times 8 \times 10^{-3} \times \frac{500}{\pi} = 0.8A$$

13-4

(1)

$$B = \frac{\Phi}{S} = 0.02T$$

$$H = \frac{NI}{2\pi R} = \frac{300 \times 0.032}{0.3} = 32\text{A/m}$$
$$M = \frac{B}{\mu_0} - H = \frac{0.02}{4\pi \times 10^{-7}} - 32 = 1.59 \times 10^4 \text{A/m}$$

(2) $j_m = M = 1.59 \times 10^4 \text{A/m}$

(3)

$$\mu_r = \frac{B}{\mu_0 H} = \frac{0.02}{4\pi \times 10^{-7} \times 32} = 496$$

13-8

(1) 设一个铁原子磁矩为 P_{m1}

$$N = \frac{\rho V}{M} \cdot N_A$$
$$P_m = P_{m1} \cdot N = 7.57 \text{A} \cdot \text{m}^2$$

(2)

$$M = P_m \cdot B \sin 90° = 11.4 \text{N} \cdot \text{m}$$