By Ampere's Law,

$$H_m l_m + H_g l_g = 0 \quad (1)$$

$$\Rightarrow H_m = -\frac{l_g}{l_m} H_g$$

$$H_g = \frac{B_g}{\mu_0}$$

$$\Rightarrow H_m = -\frac{l_g}{l_m} \frac{B_g}{\mu_0} \quad (2)$$

Now, $\quad B_m A_m = B_g A_g = \Phi_g \quad (3)$

$$\Rightarrow B_g = \frac{B_m A_m}{A_g} \quad (4)$$

Put value of B_g in Eq. (2)

$$H_m = -\frac{l_g}{l_m} \frac{A_m}{A_g} \frac{B_m}{\mu_0} \quad (5)$$