

Similar to the Current Sheet

Wire Density

$$n \equiv \frac{\text{number of wires}}{\text{unit length}}$$

$$\oint_{\text{loop}} \vec{B} \cdot d\vec{l} = \int_a^b \vec{B} \cdot d\vec{l} + \int_c^d \vec{B} \cdot d\vec{l}$$

$$= BL + BL$$

Total integral around the loop

$$\oint_{\text{loop}} \vec{B} \cdot d\vec{l} = 2BL = \mu_0 I_{\text{enclosed}}$$

$$\therefore B = \frac{\mu_0 N I}{2L} = \frac{\mu_0 n I}{2}$$