

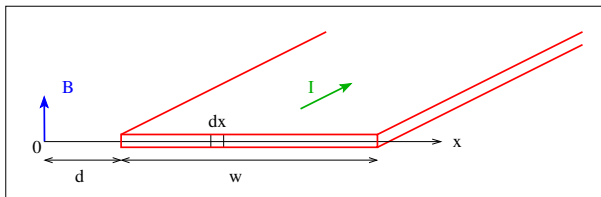
Magnetic Field Next to Current-Carrying Ribbon



Consider a very long ribbon of width w carrying a current I in the direction shown.

The current density is assumed to be uniform.

Find the magnetic field B generated a distance d from the ribbon as shown.



Divide the ribbon into thin strips of width dx .

Treat each strip as a wire with current $dI = Idx/w$.

Sum up the field contributions from parallel wires.

$$dB = \frac{\mu_0}{2\pi} \frac{dI}{x} = \frac{\mu_0 I}{2\pi w} \frac{dx}{x}$$

$$B = \frac{\mu_0 I}{2\pi w} \int_d^{d+w} \frac{dx}{x} = \frac{\mu_0 I}{2\pi w} \ln \left(1 + \frac{w}{d} \right)$$