Physics with Synno – Move Without Contact – Lesson 7

M.3 Magnetic Forces on Currents

Video: Force on a Current Carrying Wire in a Magnetic field

Because a current produces a magnetic field, if a current carrying wire is placed in another magnetic field there will be a force produced.
The direction of this force is worked out using the Right Hand Push Rule for forces on currents which states point your fingers in the direction of the field, thumb in the direction of the current and your palm will push in the direction of the force.

The strength of the force depends on four things

i) the size of the current
ii) the strength of the magnetic field
iii) the length of the wire
iv) the number of wires

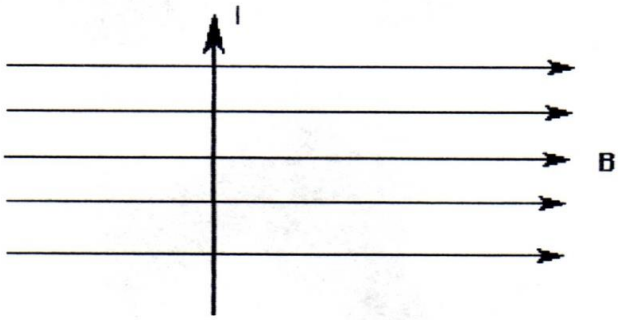
The Strength of the force can be calculated using the following formula

$$\mathbf{F} = n\ I\ L\ \mathbf{B}$$

where

n = the number of wires
I = the current
B = the magnetic field
L = the length of the conductor

Note: the angle between field and current is also a factor. In this course we only consider when they are parallel (**F** = 0 N) or perpendicular.
Example: A wire carrying a current of 3.4 A is placed at right angles to a magnetic field of strength 0.20 T, as shown. Calculate the magnitude and direction of the force on a wire of length 0.80 m



$$\mathbf{F} = n\ I\ L\ \mathbf{B}$$
$$= 1 \times 3.4 \times 0.80 \times 0.20$$
$$= 0.54\ \text{N}$$

Direction Into page