How to construct a magnetic field pattern around a solenoid

When current flows through a solenoid, magnetic poles are induced, which can be determined, using the right hand grip rule.

The field lines in the inside and outside can be plotted as shown below. Fig.5 represents the complete diagram and fig.6 shows a simpler modified version.

How to construct magnetic field pattern around two current carrying wires

When two current carrying wires are placed close together, their combined magnetic field pattern can be constructed as shown below.

Fig.1 and Fig.2 shows two current carrying wires, which are carrying current in the same direction. When these wires are moved towards each other, their individual magnetic field lines will overlap with each other, this will generate a force. Experiments have shown that the force experienced by the two wires is of an attractive nature that is, these two wires will move towards each other.

Fig.3 shows two wires which are carrying current in the opposite direction. The field pattern is indicated on the diagram when these wires are brought close to each other, their individual magnetic field lines will overlap each other and therefore creating a force, experiments have shown that this force is of a respulsive nature, that is, the two wires will move away from each other, hence we can conclude that unlike currents repel each other

Flemmings left hand rule

When a *current carrying wire* or a *charged particle* enters a magnetic field, it experiences a *force*, the direction of this force can be worked out using flemmings left hand rule. In this rule, the first finger points in the direction of the magnetic field, that is from north to south, the second finger points in the direction of the current and the

thumb indicates the direction of the force. Flemmings left hand rule is used in the working of loud speakers and in the working of DC motors:

Difference between flemmings right hand rule and left hand

- We use the right hand rule to find the induced current (field and force will be given) and is used in AC generators
- We use the left hand rule to find the force (field and current will be given) and is used in DC motor

For a positive charge, the second finger points in the direction of the positive charge, but for a negative charge, the second finger points in the *opposite* direction of the negative charge