## The Sine waves

### Induced Voltage and Current

When a conductor cuts across magnetic flux, a voltage is induced in the conductor. The amount of *induced voltage* is a function of the amount of flux cut by the conductor per unit of time. The amount of *flux cut per unit of time* is in turn determined by:

- The speed of the conductor
- The flux density
- The angle at which the conductor crosses the magnetic flux

The direction of an induced current is determined by two factors:

1. The direction in which the conductor is moving
2. The polarity of the magnetic field or the direction of the flux

The direction of induced current can be determined by using *the left-hand rule*, which is illustrated in Fig.A. In this figure, the thumb indicates the direction of conductor movement. The index finger is aligned with the direction of the flux. The middle finger indicates the direction the current flows.

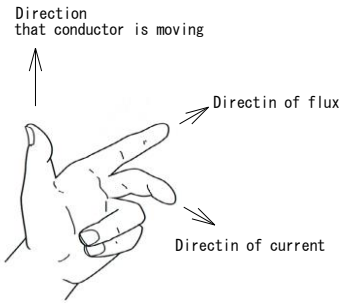


Fig.A

## AC generator

### Generator Voltage

In a generator, the rotating winding consists of multiturn coils. The voltage induced in each turn of a coil aids the voltage induced in every other turn. The output voltage of a generator is dependent on

1. The number of turns in the rotating coils
2. The speed at which the coil rotate
3. The flux density of the magnetic field

### Generator Frequency

The frequency of the sine wave produced by a generator is determined by

-the number of pairs of magnetic poles and

-the rotational speed of the coils.

A two-pole(one-pair) generator produces one cycle for each revolution. If a generator is rotating at 60 revolutions per minute (r/min), which is 1 r/s, the frequency is 1 Hz (one cycle per second).

Stated as a formula, the frequency of a generator's output is

$$\text{Frequency} = \frac{r/min}{60} \times pairs\ of\ poles$$