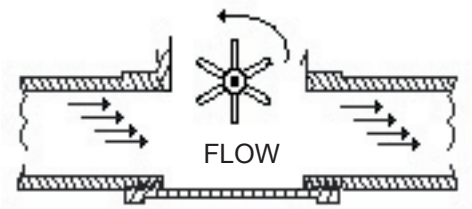
Student Notes

Pressure, Resistance, and Fluid Flow

Another form of Mechanical Potential Energy is Pressure, symbolized by P.



If we were to increase the pressure applied to the pipe in the figure above using either a piston or a water tower, we would see an increase in the fluid flow, designated as Q. Also, if we were to increase the resistance of the pipe shown above, we would decrease Q. Using this information Mechanical Engineers have developed the following equation:

$$P = QR$$

Or we can rearrange Equation 7 and say that:

$$Q = P/R \qquad \text{Eq 8}$$

Please note that Equations 7 and 8 imply the following:

1. There is a direct relationship between the flow, Q, and the pressure, P. That is, if the pressure increases, the flow increases. If the pressure decreases, the flow decreases.

2. There is an indirect relationship between the flow, Q, and the resistance, R. That is, if the resistance increases, the flow decreases. If the pressure decreases, the flow increases

Ohm's Law for Electricity

In 1826, a German physicist, Georg Ohm, developed the relation between current flow, I, the electric potential, V, and the electrical resistance, R. The relationship is known as Ohm's law and is expressed in the following manner:

$$V = IR$$

Two other ways of expressing Ohm's Law are:

$$I = V/R$$

$$R = V/I$$

Please note that these equations imply the following:

There is a direct relationship between the current, I, and the voltage. That is, if the voltage increases the current flow also increases (assuming the resistance remains constant). Also, if the voltage decreases, the current decreases.

There is an inverse relationship between the current, I, and the resistance, R. That is, if the resistance increases the current decreases (assuming the voltage remains constant). Also, if the resistance decreases, the current increases.

You can determine any single value of the three (voltage, resistance or current), if you can determine the other two.