Froude's Number : (Fe)

Defined as the square root of the ratio of inertia force of a flowing fluid to the gravity force.

$$Fe = \sqrt{\frac{Fi}{Fg}}$$

Fg = Mass × Acceleration

$= \rho \times$ Volume $\times g = \rho \times L^3 \times g$

$= \rho \times L^2 \times L \times g = \rho A L g$

$$Fe = \sqrt{\frac{\rho A V^2}{\rho A L g}} = \sqrt{\frac{V^2}{Lg}} = \frac{V}{\sqrt{Lg}}$$

$$\boxed{Fe = \frac{V}{\sqrt{Lg}}}$$

Euler's number : (Eu)

Defined as the square root of the ratio of the inertia force of a flowing fluid to the pressure force.

$$Eu = \sqrt{\frac{Fi}{Fp}}$$

$$= \sqrt{\frac{\rho A V^2}{P \times A}} = \sqrt{\frac{V^2}{\frac{P}{\rho}}} = \frac{V}{\sqrt{\frac{P}{\rho}}}$$

$$\boxed{Eu = \frac{V}{\sqrt{\frac{P}{\rho}}}}$$

Weber's Number : (We)

Defined as the square root of the ratio of the inertia force of a flowing fluid to the surface tension force.

$$We = \sqrt{\frac{Fi}{Fs}}$$

$$= \sqrt{\frac{\rho A V^2}{\sigma \times L}} = \sqrt{\frac{\rho L^2 V^2}{\sigma L}} = \sqrt{\frac{\rho L V^2}{\sigma}}$$