

$$= \sqrt{\frac{V^2}{\frac{\sigma}{eL}}} = \frac{V^2}{\sqrt{\frac{\sigma}{eL}}}$$

$$\boxed{We = \frac{V^2}{\sqrt{\frac{\sigma}{eL}}}}$$

Mach's Number: (M)

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

$$M = \sqrt{\frac{F_i}{F_e}}$$

[K = Elastic stress]

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

$$M = \frac{V}{\sqrt{\frac{K}{e}}} = \frac{V}{c}$$

where $\sqrt{\frac{K}{e}} = c$ - Velocity of sound in fluid

$$\boxed{M = \frac{V}{c}} \rightarrow \boxed{c = \sqrt{\frac{K}{e}}}$$

MODEL LAWS (OR) SIMILARITY LAWS:

The laws on which the models are designed for dynamic similarity are called model laws or laws of similarity. Followings are the model laws:

1. Reynold's model law
2. Froude model law
3. Euler model law
4. Weber model law
5. Mach model law

Reynold's model law:

It is the law in which models are based on Reynold's number. Applications: (i) pipe flow (ii) Resistance experienced by sub-marines, airplanes, etc.

