

Viscosity (μ) :

- Newton postulated that τ is proportional to the quantity $\Delta u / \Delta y$ where Δy is the distance of separation of the two layers and Δu is the difference in their velocities.
- In the limiting case of , $\Delta u / \Delta y$ equals du/dy , the velocity gradient at a point in a direction perpendicular to the direction of the motion of the layer.
- According to Newton τ and du/dy bears the relation

$$\tau = \mu \frac{du}{dy} \quad (1.7)$$

where, the constant of proportionality μ is known as the **coefficient of viscosity** or simply viscosity which is a property of the fluid and depends on its state. Sign of τ depends upon the sign of du/dy . For the profile shown in Fig. 1.5, du/dy is positive everywhere and hence, τ is positive. Both the velocity and stress are considered positive in the positive direction of the coordinate parallel to them.

Equation

$$\tau = \mu \frac{du}{dy}$$

defining the viscosity of a fluid, is known as Newton's law of viscosity. Common fluids, viz. water, air, mercury obey Newton's law of viscosity and are known as **Newtonian fluids**.