Dynamic viscosity The SI physical unit of *dynamic* viscosity μ is the Pascal×second

$$[\mu] = 1\,\mathrm{Pa}\cdot\mathrm{s} = 1\,\mathrm{kg}/(\mathrm{m}\cdot\mathrm{s}) \tag{5.9}$$

If a fluid with a viscosity $\mu = 1\,\mathrm{Pa}\cdot\mathrm{s}$ is placed between two plates, and one plate is pushed sideways with a shear stress of one pascal, it moves a distance equal to the thickness of the layer between the plates in one second. The dynamic viscosity of water ($T = 20\,^\circ\mathrm{C}$) is $\mu = 1.0020 \times 10^{-3}\,\mathrm{Pa}\cdot\mathrm{s}$.

Kinematic viscosity Below we will be interested in comparing viscous and inertial forces. Their ratio is characterized by the *kinematic* viscosity ν, defined as

$$\nu = \frac{\mu}{\varrho}\,, \qquad [\nu] = \mathrm{m}^2/\mathrm{s} \tag{5.10}$$

The kinematic viscosity of water with mass density $\varrho = 1\,\mathrm{g/cm^3}$ is $\nu = 10^{-6}\,\mathrm{m}^2/\mathrm{s} = 1\,\mathrm{mm}^2/s = 1\,\mathrm{cSt}$.