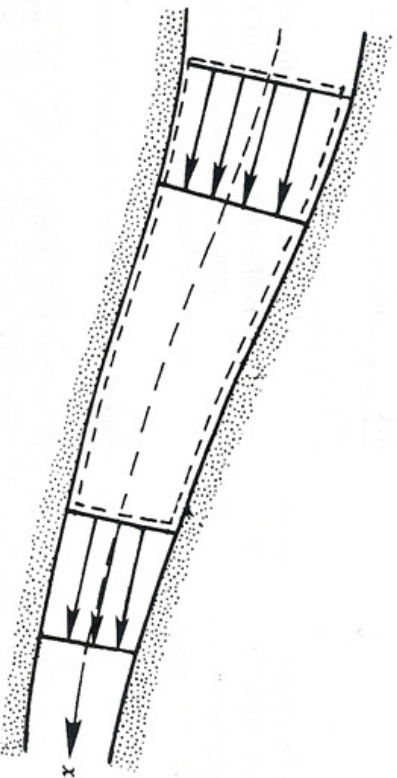


# 1D compressible flow



- $\frac{dp}{\rho} + \frac{du}{u} + \frac{dA}{A} = 0$
- $\frac{dp}{\rho} + udu = 0$
- $\frac{dp}{p} = \gamma \frac{dp}{\rho} = \frac{\gamma}{\gamma-1} \frac{dT}{T}$

$$udu = -\frac{dp}{\rho} = -\frac{\gamma p}{\rho} \frac{dp}{p} = -\gamma RT \frac{dp}{\rho} = -a^2 \frac{dp}{\rho}$$

$$\frac{dp}{\rho} = -M^2 \frac{du}{u}$$

$$0 = \frac{dp}{\rho} + \frac{du}{u} + \frac{dA}{A} = (1 - M^2) \frac{du}{u} + \frac{dA}{A}$$

$$\frac{du}{u} = -\frac{1}{1 - M^2} \frac{dA}{A}$$