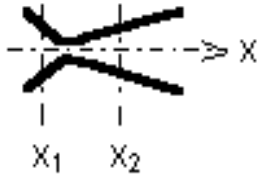
The **analysis of compressible fluid flow** involves four equations of particular interest:
Energy - Continuity - Momentum - The equation of state

Conservation of energy, isentropic flow (no heat exchange, no friction) between x1 and x2:




$$h_1 - h_2 = \tfrac{1}{2}\left(v_2^2 - v_1^2\right) = C_p\left(T_1 - T_2\right) \quad \text{[eq. 1]}$$

Enthalpy h, v velocity in x-direction, Cp heat capacity, T1, T2 temperatures at x1, x2.

Change (decrease) in enthalpy is equal to the change (increase) in kinetic energy
► heat of the fluid is being used to accelerate the flow!

For isentropic flow: temperature, pressure, and fluid density ρ

$$\frac{T_o}{T} = \left(\frac{P_o}{P}\right)^{\frac{k-1}{k}} = \left(\frac{\rho_o}{\rho}\right)^{k-1} \quad \text{[eq. 2]}$$

with k: ratio of specific heats $k \equiv \frac{C_p}{C_v} = \frac{C_p}{C_p - R}$

and R = R'/mol.weight, R': Avogadro's constant