

## [tex99] Sound velocity in the classical ideal gas II

Show that the internal energy per unit mass and the enthalpy per unit mass of a classical ideal gas with heat capacity  $C_V = \text{const}$  can be expressed as follows in terms of the sound velocity  $c = \sqrt{(\partial p / \partial \rho)_S}$  and the ratio of heat capacities  $\gamma = C_p / C_V$ :

$$\bar{U} = \bar{U}_0 + \frac{c^2}{\gamma(\gamma - 1)}, \quad \bar{E} = \bar{U}_0 + \frac{c^2}{\gamma - 1},$$

where  $\bar{U}_0$  is a constant.

**Solution:**