

Homework 9

The following two problems are about the profile of different physical quantities in the atmosphere of Earth. Because we are interested in elevations of few kilometers, we will assume plain geometry with constant acceleration of gravity g . The atmosphere is in hydrostatic equilibrium.

(1) Find the density $\rho(z)$ and entropy $s(z)$ for the isothermal atmosphere with temperature T_0 . Assume a simple equation of state $P = s\rho^\gamma$. Assume that we know density ρ_0 at the sea level. Parameters γ and molecular weight μ are also known.

(2) Find the density and temperature for the adiabatic atmosphere $s = s_0 = \text{const}$. All other parameters are given as in the previous problem.