

# Brunt-Vaisala frequency of planets

An air parcel moves according to the spring equation:  $\frac{d}{dt}(z - z_0) + N^2(z - z_0) = 0$

N is called the Brunt-Vaisala frequency, given by:  $N^2 = \frac{g}{T}(\Gamma - \Gamma_a)$

Temperature is assumed to be a linear function:  $T = T_0 - \Gamma z$

The slope Gamma is called the lapse rate, measured in K/m  $\Gamma = \frac{-dT}{dz}$

Gamma\_a is the adiabatic lapse rate:  $\Gamma_a = \frac{g}{c_p}$

So we use MATLAB to solve the spring equation for three planets: Earth, Mars, and Jupiter, using Runge-Kutta.

