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.