[mex158] Linearly damped spherical pendulum

Consider the spherical pendulum with Lagrangian $L(\theta, \phi, \dot{\theta}, \dot{\phi})$ as analyzed in [mex156]. Now we assume that the motion is subject to a linear damping force $\mathbf{R} = -\beta v(\mathbf{v}/v)$. Find the dissipation function $P(\theta, \phi, \dot{\theta}, \dot{\phi})$ representing this kind of attenuation and derive from it the damping torques $R_\theta = -\partial P/\partial \dot{\theta}$, $R_\phi = -\partial P/\partial \dot{\phi}$ acting on the angular coordinates θ, ϕ, respectively.

Solution: