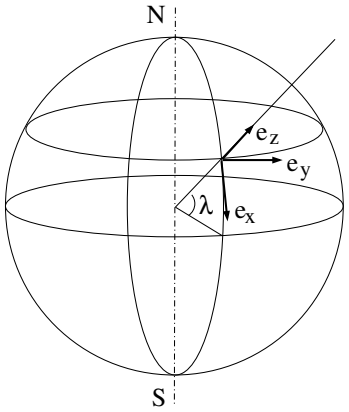
[mex65] Lateral deflection of projectile due to Coriolis force

Consider a location at northern latitude λ on the Earth's surface. A particle is projected due east with initial speed v_0 and angle of inclination α above the horizontal. Find the lateral deflection d_x due to the Coriolis force of the point where the particle strikes the ground. Perform the calculation to leading order in ω, the angular frequency of the Earth's rotation. Express d_x as a function of $v_0, g, \alpha, \lambda, \omega$. Evaluate the range R (to zeroth order in ω) and the lateral deflection d_x (to first order in ω) for the case where a projectile is launched at $\lambda = 45^\circ$ latitude with speed $v_0 = 100\text{m/s}$ at angle $\alpha = 45^\circ$.



Solution: