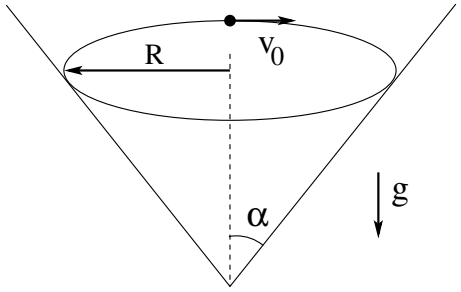
[mex120] Vertical range of particle sliding inside cone

Consider a conical surface with vertical axis (z) and apex with angle 2α at the bottom in a uniform gravitational field g. A particle of mass m is projected horizontally with velocity v_0 at a distance R from the axis on the inside of the cone. (a) How must v_0 be chosen to keep the particle on a horizontal circular path? (b) If v_0 is smaller (larger) than the value required to keep it on a horizontal circle, the resulting path will explore a band with $r_{min} \leq r \leq R$ ($R \leq r \leq r_{max}$). Find r_{min} and r_{max}.



Solution: