**Problem 1**

A hollow sphere of radius $R = 0.5$ m rotates about a vertical axis through its centre with an angular velocity of $\omega = 5\ \mathrm{s}^{-1}$. Inside the sphere a small block is moving together with the sphere at the height of $R/2$ (*Fig. 6*). ($g = 10\ \mathrm{m/s}^2$.)

a) What should be at least the coefficient of friction to fulfill this condition?

b) Find the minimal coefficient of friction also for the case of $\omega = 8\ \mathrm{s}^{-1}$.

c) Investigate the problem of stability in both cases,

α) for a small change of the position of the block,

β) for a small change of the angular velocity of the sphere.

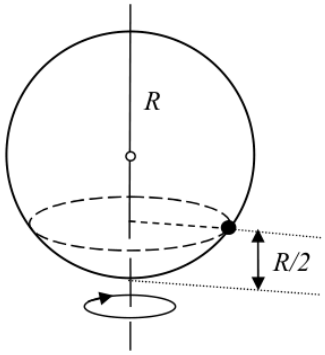



*Figure 6*

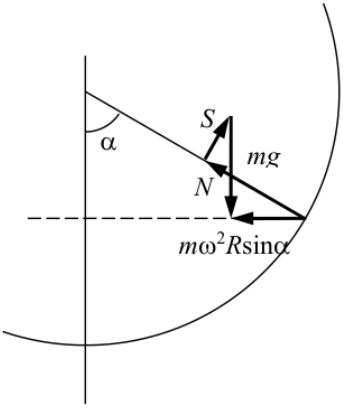



*Figure 7*