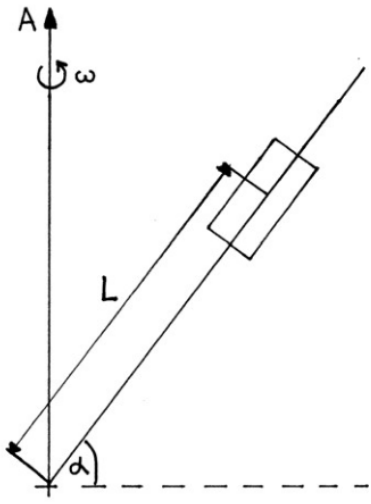
Theoretical problem 1: "Rotating rod"



A rod revolves with a constant angular velocity ω around a vertical axis A. The rod includes a fixed angle of $\pi/2 - \alpha$ with the axis. A body of mass m can glide along the rod. The coefficient of friction is $\mu = \tan\beta$. The angle β is called „friction angle".

a) Determine the angles α under which the body remains at rest and under which the body is in motion if the rod is not rotating (i.e. $\omega = 0$).

b) The rod rotates with constant angular velocity $\omega > 0$. The angle α does not change during rotation. Find the condition for the body to remain at rest relative to the rod.

You can use the following relations:

$$\sin(\alpha \pm \beta) = \sin\alpha \cdot \cos\beta \pm \cos\alpha \cdot \sin\beta$$

$$\cos(\alpha \pm \beta) = \cos\alpha \cdot \cos\beta \mp \sin\alpha \cdot \sin\beta$$