

Klassische Teilchen und Felder

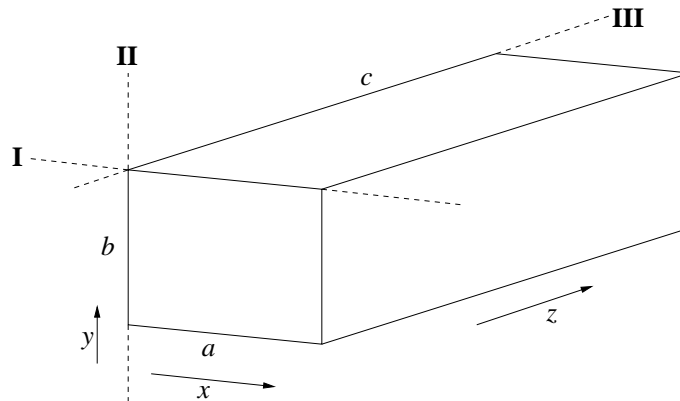
Präsenzübung, Blatt 04

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[P8] parallelepiped

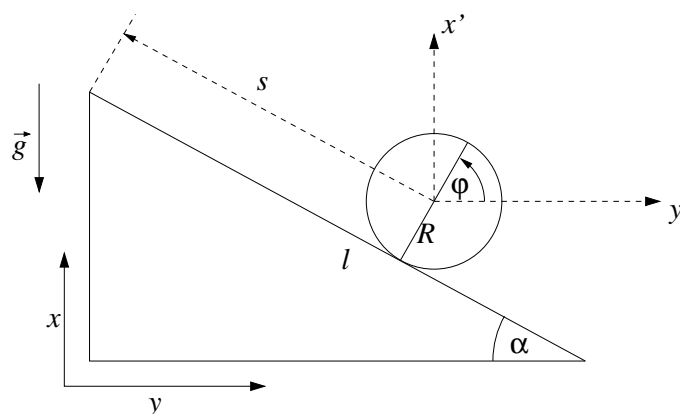
Consider a parallelepiped with homogeneous mass density ρ_0 and edge lengths a, b and c (with $b < a < c$).



- Calculate the center of mass.
- Find the principal axes of inertia and the principal momenta of inertia.
- Calculate the momenta of inertia for rotations around the axes I, II and III (see figure).
- Find the angular frequencies of small oscillations in the gravitational field around the axes I, II and III.

[P9] rolling movement

A homogeneous cylinder of mass M and radius R is rolling on a ramp (see figure).



- Calculate the moment of inertia for rotations around the z -axis.
- Find the potential energy.
- As there are no dissipative forces involved the total energy is conserved. Hence $dE/dt = 0$ holds. Derive an equation for s .
What happens if the cylinder is sliding (instead of rolling)?