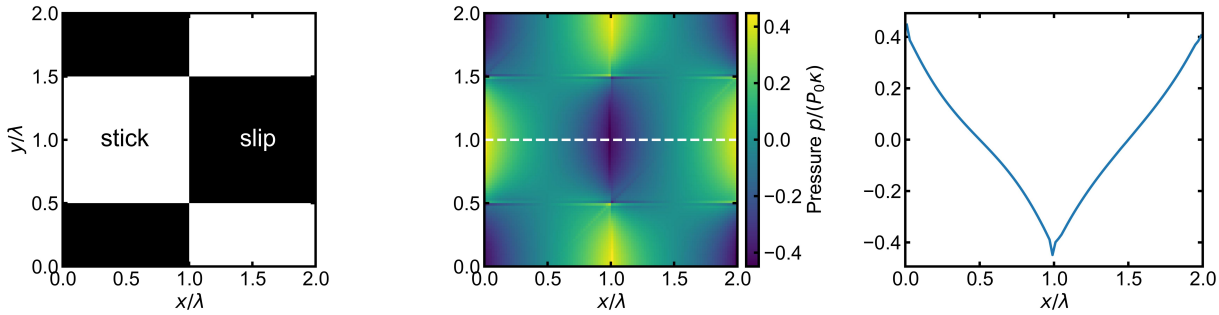
Karlsruhe Institute of Technology

IAM
Institut für Angewandte Materialien

# Open Hiwi Position:
# Multiscale Simulation of Lubrication

## Background

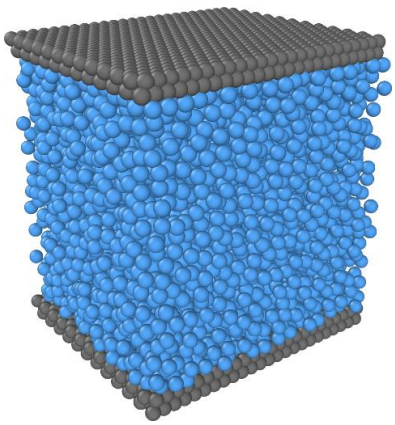
Lubricated friction determines human interaction with the environment as well as function and reliability of machinery. In the so-called boundary lubrication regime, the contacting bodies are separated only by a few layers of molecules and therefore, the confined fluid often behaves differently than in the bulk. However, macroscopic properties of the lubricated contact are typically measured under entrainment conditions which are out of reach with molecular length and time scales. To address this multiscale problem, within the *RTG2450 – Tailored Scale-Bridging Approaches To Computational Nanoscience*, we develop simulation methods to predict energy dissipation and deformation in these systems.




*Flat channel with stick-slip nanostructure (left), 2D (middle) and centerline (right) dimensionless pressure under shearing conditions.*

## Possible Tasks

We are looking for motivated students to work with simulations of confined liquids on various scales ranging from atomistic methods to macroscopic hydrodynamics. With the developed tools, you will address research questions arising in, e.g. the dynamics of fluctuation-driven processes such as cavitation bubble nucleation, or the influence of surface roughness and slip on load-bearing performance.



*Snapshot of MD simulation: Lennard-Jones fluid confined between rigid walls.*

## Requirements

- Interest in numerical simulation methods
- Basic programming skills (e.g. in Python)

## Contact

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GRK 2450