# Mass and Momentum Transport in Turbulent Boundary Layers Over Permeable and Impermeable Rough Surfaces

- **Fundamental numerical experiments** on turbulent boundary layers over rough, permeable and impermeable surfaces using pore-resolved, direct numerical simulations (DNS).

- **Algorithmic developments for accurate simulation of unsteady Advection-Diffusion-Reaction (ADR)** equation in the immersed-boundary/fictitious domain framework with mixed boundary conditions on immersed surfaces.

- Modeling **of mass transport across the interface using Lagrangian** fluid as well as inertial particles.

- Development, implementation, and testing of a **reduced-order large-eddy simulation (LES)** based model for transport across permeable surfaces.

- **Large-scale computing on Frontera (up to 2500 processors)**
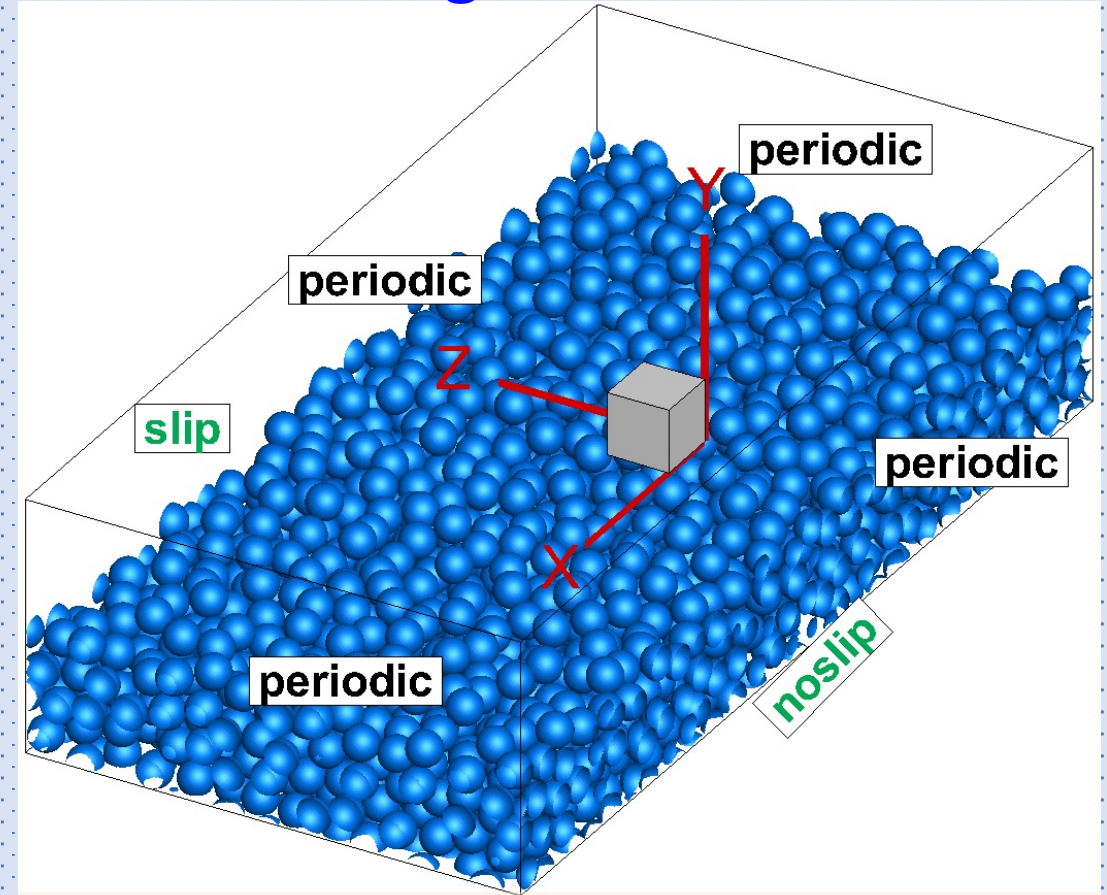
Highly motivated PhD students with background and interest in CFD, turbulence, parallel processing, algorithm development are encouraged to apply. Contact: Dr. Apte (sva@oregonstate.edu)