

AN EFFECTIVE BOUNDARY CONDITION FOR AN INCOMPRESSIBLE VISCOUS FLOW IN A ROUGH PIPE

Maja Starčević (University of Zagreb)

An incompressible viscous fluid flow through a pipe is observed. The side of the pipe consists of asperities which are periodically distributed. The flow is described by incompressible Stokes equations. We assume constant pressures and a normal velocity on the inflow/outflow boundary.

The aim is to deduce a boundary condition for the flow in a simplified approximated domain. The asymptotic expansion is done on the pipe that is obtained from the original one by flattening, thus we do asymptotics in one direction. We deduce the corresponding approximation of the flow and confirm it in appropriate norms. The approximation leads to a boundary condition of Navier type that is posed on an artificial smooth boundary near the lateral boundary of the original flow domain.

Based on joint work with Eduard Marušić-Paloka.