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# NAVIER STOKES EQUATION IN 3D THIN DOMAINS UNDER PHYSICALLY RELEVANT BOUNDARY CONDITIONS

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In this talk we study the Navier-Stokes equations in 3D thin domains under various boundary conditions including Navier friction boundary, interface boundary and vorticity boundary conditions. We prove the global existence of strong solutions to the 3D Navier-Stokes equations when the initial data and external forces are in large sets as the thickness of the domain is small. We generalize the techniques developed to study the 3D Navier Stokes equations in thin domains to the above mentioned boundary conditions by introducing a new average operator in the thin direction according to the spectral decomposition of the Stokes operator $A_\varepsilon$. Our analysis relies on the refined investigation of the eigenvalue problem corresponding to the Stokes operator $A_\varepsilon$ with Navier friction boundary and interface boundary conditions.

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