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Dynamics of particle clusters at fluid/fluid interfaces[1] SRINATH MADHAVAN[2], Ph.D. Candidate, University of Alberta, PETER MINEV[3], Professor, University of Alberta, KRISHNASWAMY NANDAKUMAR[4], Professor Emeritus, University of Alberta — This talk is oriented toward research that describes the hydrodynamics of dense (relative to the lower fluid in a gravitational field) rigid particles at fluid-fluid interfaces through Direct Numerical Simulations (DNS). Understanding the factors that control the formation and stability of the complex rag layer (typically encountered during oil-water separation) is a motivation for the current study. The fundamental aspects of the problem at hand bear a connection with the formation of tight clusters of floating particles. Strong capillary forces are thought to promote this behavior. One of the challenges toward realizing the same in a numerical simulation is the implementation of a physically realistic boundary condition for the three phase moving contact line (MCL). To this end, we implement the recently proposed continuum form of the Generalized Navier Boundary Condition (Gerbeau and Lelievre, 2009) in a levelset and fictitious-domain based finite-element scheme and demonstrate its usefulness and accuracy through case studies.

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