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**A Computational Study of the Rheology and Structure of Surfactant Covered Droplets** JOAO MAIA, ARMAN BOROMAND, Case Western Reserve University — Using different types of surface-active agents are ubiquitous in different industrial applications ranging from cosmetic and food industries to polymeric nano-composite and blends. This allows to produce stable multiphase systems like foams and emulsions whose stability and shelf-life are directly determined by the efficiency and the type of the surfactant molecules. Moreover, presence and self-assembly of these species on an interface will display complex dynamics and structural evolution under different processing conditions. Analogous to bulk rheology of complex systems, surfactant covered interfaces will response to an external mechanical forces or deformation differently depends on the molecular configuration and topology of the system constituents. Although the effect of molecular configuration of the surface-active molecules on the planar interfaces has been studied both experimentally and computationally, it remains challenging from both experimental and computational aspects to track efficiency and effectiveness of different surfactant molecules with different molecular geometries on curved interfaces. Using Dissipative Particle Dynamics, we have studies effectiveness and efficiency of different surfactant molecules on a curved interface in equilibrium and far from equilibrium. Interfacial tension is calculated for linear and branched surfactant with different hydrophobic and hydrophilic tail and head groups with different branching densities. Deformation parameter and Taylor plots are obtained for individual surfactant molecules under shear flow.

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