Numerical simulations of interacting surfactant-laden jets in microfluidic channels[1] GARVIT GOEL, IIT Delhi, JUNFENG YANG, JOAO CABRAL, OMAR MATAR, Imperial College London — We consider the dynamics of jets of surfactant solution in oil under microfluidic confinement. Previous experimental work has demonstrated the occurrence of "jetting" and "dripping" flow regimes depending on the choice of oil and water flow rates, viscosity ratio, and surfactant concentration. To take into account the influence of soluble surfactant on the behaviour of the jets, we present a computational fluid dynamics (CFD) approach which uses the Volume-of-Fluid method capturing the interface topology accurately with minimal mass loss. This approach accounts for sorption kinetics, Marangoni stresses, diffusion, and surface dilation. This method is incorporated into a CFD code to study the jetting and dripping regimes in a microfluidics channel. The modelling results are validated against experimental measurements.

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