

Abstract Submitted  
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**The role of surfactants on the interfacial stability of multilayer shear flows**<sup>1</sup> ANNA KALOGIROU, University of Nottingham — This talk will present a theoretical study that utilises mathematical modelling and numerical computations to scrutinise the effect of surfactants on the stability of multilayer shear flows in channels. Understanding stability is essential for efficient flow control in applications where (stable) uniform films or (unstable) interfacial waves are desired. In particular, a shear flow of two immiscible fluid layers in a horizontal channel is considered. One of the fluids is contaminated with surfactants, which can get adsorbed at the interface or form micelles when their concentration is beyond a critical value. An asymptotic model is derived in the long-wave approximation, consisting of a system of highly nonlinear PDEs describing the evolution of the interface as well as interfacial, bulk and micelle surfactant concentrations. The effect of surfactants and their sorption kinetics on the flow stability is investigated via a linear stability analysis, aiming to establish regions in the parameter space where instability and non-trivial dynamics are expected. The identified instabilities are followed into the nonlinear regime via numerical computations of the model system. The underlying physical mechanism responsible for the formation of interfacial waves will also be discussed.

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