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Suppression of the Rayleigh-Plateau instability on a vertical fibre coated with wormlike micelle solutions FRANÇOIS BOULOGNE[1], LUDOVIC PAUCHARD, FRÉDÉRIQUE GIORGIUTTI-DAUPHINÉ, UPMC Univ Paris 06, Univ Paris-Sud, CNRS, Lab FAST Orsay France, MARC-ANTOINE FARDIN, SANDRA LEROUGE, Laboratoire Matière et Systèmes Complexes, CNRS UMR 7057, Université Paris Diderot, Paris, France — When a liquid film is coating a fibre, it undergoes spatial thickness variations due to the Rayleigh-Plateau instability. We report on the Rayleigh-Plateau instability in films of giant micelles solutions coating a vertical fibre. We observe that the dynamics of thin films coating the fibre could be very different from the Newtonian or standard Non-Newtonian cases. By varying the concentration of the components of the solutions and depending on the film thickness, we show for the first time that the Rayleigh-Plateau instability can be stabilized using surfactant solutions. Using global rheology and optical visualisations, we show that the development of shear-induced structures is required to stabilize the micellar film along the fibre. Assuming that the viscoelastic properties of the shear-induced state can be described by a simple model, we suggest that, in addition to the presence of shear-induced structures, the latter must have an elastic modulus greater than a critical value evaluated from a linear stability analysis. Finally, our analysis provides a way of estimating the bulk elasticity of the shear-induced state.

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