Abstract Submitted
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Flow down a fibre at moderate Reynolds number GRIGORI SISOEV, Birmingham University, RICHARD CRASTER, OMAR MATAR, Imperial College London — We consider the axisymmetric flow of a film down the exterior of a rigid straight vertical cylinder. A system of evolution equations for the film thickness and volumetric flow rate that was first derived by Trifonov (1992), has been re-formulated as an extension of the classical falling film problem. To inspire confidence in the predictions of this model, its linear stability characteristics versus those of the full Navier-Stokes equations are examined yielding very good agreement. Travelling wave solutions are determined and analysed in detail over a wide range of system parameters. The solutions resemble those associated with a film flowing down a plane for sufficiently small film thickness to fibre radius ratios, and beads when these ratios are relatively large. Transient computations are also performed for comparison with the travelling wave solutions and demonstrate the selection mechanism leading to the development of so-called 'dominating' waves for comparison with experimental observations.

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