

Abstract Submitted
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Three-dimensional modelling of film flows over spinning disks¹

KUN ZHAO, ALEX WRAY, JUNFENG YANG, OMAR MATAR, Imperial College London — Film flows over spinning disks are of central importance to a wide array of industrial processes, such as the augmentation of heat and mass transfer in chemical reactors, or power production in metallurgy. As a result they have been extensively investigated experimentally. Theoretically they constitute an interesting problem due to the interplay of inertial, capillary, centrifugal and Coriolis forces. However, modelling efforts have typically been restricted to the consideration of the one-dimensional axisymmetric situation. We extend the existing models to incorporate azimuthal variations. The resultant system is solved via the use of an operator-splitting method. In addition, we have performed Direct Numerical Simulations of the system. We compare the low order model, the direct simulations and the results of experiments, to reveal a wide variety of different flow regimes in accordance with existing literature.

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