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The flow of a thin conducting film over a spinning disc in the presence of an electric field CHRIS LAWRENCE, OMAR KAMAL MATAR, Imperial College London — The effect of an electric field on the flow of a thin conducting film over a spinning disc is studied. The electric field is imposed by applying a potential between the disc and an electrode overlying the film. The integral method and lubrication theory are used to derive a coupled set of evolution equations for the film thickness, radial flow rate and angular momentum. The results of our numerical simulations indicate that increasing the intensity of the electric field and decreasing the electrode separation exert a destabilizing effect leading to the formation of interfacial waves of larger amplitude than in the absence of electric effects. Spatial and temporal variations of the electric field also lead to complex film dynamics which give rise to sustained wave formation over a large fraction of the spinning disc. These results suggest that the application of an electric field can enhance the degree of wave-induced process intensification.

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