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Electrified viscous thin film flow over topography[1] DEMETRIOS PAPAGEORGIOU, New Jersey Institute of Technology, DMITRI TSELUIKO, MARK BLYTH, JEAN-MARC VANDEN-BROECK — We investigate the gravity-driven flow of a liquid film down an inclined wall with periodic indentations in the presence of a normal electric field. The film is assumed to be a perfect conductor and the bounding air region above is a perfect dielectric. We study the interaction between the electric field and the topography at steady state conditions. Using a long-wave analysis we derive a nonlinear, non-local evolution equation for the thickness of the liquid film and compute steady solutions for flow into a rectangular trench and over a rectangular mound, for example. We demonstrate that the electric field can be used to reduce or completely remove the familiar ridge features seen ahead of a downward step. Boundary integral computations of the full problem are also presented and compared with the long-wave theory.

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Sheldon Wang
New Jersey Institute of Technology

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