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Morphology evolution of solid thin films in the presence of long range de-wetting interactions ADI CONSTANTINESCU, West Virginia University, ARTEM LEVANDOVSKY, University of Californina Riverside, LEONARDO GOLUBOVIC, West Virginia University — The thin films of metals, such as cobalt or silver on substrates such as sapphire exhibit a striking formation of multilayered islands that reach heights many times larger than the initial film thickness. Here, we theoretically elucidate these phenomena within an interface dynamics model which incorporates both Mullins type surface diffusion relaxation and long range de-wetting forces acting across the film, such as Van der Waals forces and Fermionic Casimir forces (Quantum size effect). The model is used to explore the scaling laws of multilayered island height growth as well as the coarsening laws governing surface evolution. At early times, the surface evolution is dominated by strong up-hill surface currents caused by long range Casimir-like forces. At late times however, the surface coarsening laws are universal and dominated by surface tension effects.

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