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Instability of a thin melt film LUCIEN BRUSH, University of Washington, MICHAEL BEERMAN, Andrews Space Inc. — Lubrication theory is used to study the instability and nonlinear evolution of an ultra-thin, metallic melt film in contact with its non-premelting crystal and a gas phase. Competition between destabilizing van der Waals attractive forces and the stabilizing effect of an applied thermal gradient gives rise to finite wavelength oscillatory instability. The effect of the crystal-melt interfacial energy is shown to excite a slower-growing, longer-wavelength, stationary instability. Numerical results show the evolution of stationary and oscillatory instabilities, and the interactions between unstable modes. Linearly unstable stationary modes are shown to excite the growth of oscillatory modes that ultimately lead to rupture.

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