1070-76-184 **B. S. Tilley***, Dept. Mathematical Sciences - WPI, 100 Institute Road, Worcester, MA 01609, and **M. Bowen**, 3-8-1 Komaba, Meguro-ku, Tokyo, 153-8902, Japan. *Thermally induced van der Waals rupture of thin viscous fluid sheets.*

We consider the dynamics of a thin symmetric fluid sheet subject to an initial temperature variation. The sheet is assumed to be thick enough initially so that disjoining pressures are stabilizing, but these forces may become destabilizing when the thickness of the sheet becomes sufficiently thin during its evolution. We apply a long-wave analysis in the limit where deviations from the mean sheet velocity are small, but thermocapillary stresses and heat transfer from the sheet to the environment are significant. From a linear stability analysis, we find that a stable thermal mode couples the velocity and interfacial dynamics. We also find that the phase difference between the initial temperature and velocity distributions is a key parameter in determining the nonlinear stability of the fluid sheet and consequently the time of rupture. In particular, rupture can be induced thermally even in cases when the heat transfer to the surrounding environment is significant, provided that the initial phase shift between the initial velocity and temperature disturbances is close to $\phi = \pi/2$. (Received February 10, 2011)