Abstract Submitted for the DFD09 Meeting of The American Physical Society

Dynamic contact angles of evaporating liquids on heated surfaces VLADIMIR AJAEV, Southern Methodist University, TATIANA GAMBARYAN-ROISMAN, TU Darsmtadt (Germany), JILL KLENTZMAN, University of Arizona, PATER STEPHAN, TU Darmstadt (Germany) — We studied dynamic apparent contact angle for gravity-driven flow of volatile liquid down a heated inclined plane. The apparent contact line is modeled as the transition region between the mascroscopic film and ultra-thin adsorbed film dominated by disjoining pressure effects. Three commonly used disjoining pressure models are investigated. The dynamic contact angle follows the Tanner's law remarkably well over a range of evaporation conditions. However, deviations from the predictions based on the Tanner's law are found when interface shape changes rapidly in response to rapid changes of the heater temperature. The Marangoni stresses are shown to result in increase of the values of apparent contact angles. Applications of different models of partial wetting to studies of fingering instability in evaporating liquids are also discussed.

Vladimir Ajaev Southern Methodist University

Date submitted: 07 Aug 2009 Electronic form version 1.4