Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Weakly-nonlinear evolution of surface-tension driven waves in the presence of viscosity QUINTON FARR, ROUSLAN KRECHETNIKOV, University of Alberta — Weakly nonlinear models describing the evolution of water waves such as the Korteweg-de Vries and nonlinear Schrödinger equations have been widely studied because of their ability to capture the behavior of interesting physical phenomena through the reduction of a full problem to a much simpler system retaining only first order nonlinear effects. While a large class of these reductions for gravity-driven waves are well-understood, situations where surface tension is the only driving force require further attention. We consider wave motion on a one-dimensional thin liquid film of infinite extent and on the perimeter of a two-dimensional liquid drop, forced by surface tension in lieu of gravity. Viscosity is also included to understand the effect of dissipation. Our investigation leads to new equations governing surface tension-driven waves. We discuss their properties, special solutions, and physical implications.

Rouslan Krechetnikov
University of Alberta

Date submitted: 26 Jul 2019 Electronic form version 1.4