

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

Wednesday, 30 January 2013, 4:00 p.m.

Traveling and Time-Periodic Vortex Sheets with Surface Tension

by David M. Ambrose
Drexel University

Abstract.

We study a sharp interface between two irrotational fluids in two spatial dimensions, and we account for the effect of surface tension at the interface. We consider fluids which are periodic in the horizontal direction and of infinite vertical extent. We present numerical evidence of the existence of time-periodic solutions for this problem, bifurcating from equilibrium; this is joint work with Jon Wilkening. We expect that there should also be bifurcations from traveling waves to nontrivially time-periodic solutions, and for this reason, we investigate the existence of such traveling waves. In joint work with Benjamin Akers and J. Douglas Wright, we make a new formulation of the traveling wave problem. We then use bifurcation theory to prove the existence of traveling solutions at small amplitudes. Additionally, we compute these solutions, extending to large amplitude. The large amplitude solutions include traveling waves with multi-valued height. We will discuss a number of future directions.