Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Float height of a rectangular plate in planar stagnation flow PATRICK WEIDMAN, University of Colorado at Boulder — Numerical integrations of the self-similar equations for steady planar fluid motion between infinite stationary parallel plates are reported for the case where the upper plate is impermeable and the lower plate has uniform transpiration. Such a reduction characterized by a single Reynolds number represents a new exact solution of the Navier-Stokes equations. High-Reynolds number asymptotics greatly facilitate numerical integration by a standard shooting technique. The results are applied to model the float height a rectangular plate under gravity when the plate separation distance is small. We use the results to compare the float heights of disks of fixed mass and surface area supported by axisymmetric and planar stagnation flows.

Patrick Weidman
University of Colorado at Boulder

Date submitted: 08 Aug 2009 Electronic form version 1.4