Vorticity Dynamics in Soap Films[1] PETRI FAST, Lawrence Livermore
Nat'l Lab, PAK-WING FOK, Dept. of Mathematics, MIT — Fast flowing soap films
offer an experimental realization of two-dimensional flow that allows studies of fluid-
structure interaction and vortex shedding mechanisms. The thickness of a gravity
driven soap film can undergo significant variations in experiments but most modeling
work in the past has focused on incompressible results that correspond to constant
thickness films. We discuss a viscous compressible model of soap film flow that is
equivalent to the Navier-Stokes equations with a film thickness dependent viscosity.
A new vorticity transport equation for compressible soap film flow suggests effects
unique to soap films and not predictible by a constant density incompressible theory.
New exact solutions for the soap film model will be presented. Numerical simulations
are shown to illustrate vortex shedding in soap film experiments.

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