Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Experimental studies of pinned and unpinned reaction fronts in two-dimensional, vortex-dominated flows[1] LAURA SKINNER[2], JOSEPH-JOHN SIMONS, TOM SOLOMON, Bucknell University — We present experiments that study the propagation and pinning of reaction fronts in laminar, two-dimensional fluid flows. The flows are forced using magnetohydrodynamic techniques and are composed of vortex chains and arrays with or without an imposed wind. The reaction fronts are produced by the excitable, ferroin-catalyzed Belousov-Zhabotinsky chemical reaction. We consider how the addition of time-periodic oscillations of the flow can affect the pinning of reaction fronts.[3] Furthermore, we measure the speed at which reaction fronts propagate in the flow, looking for scaling of the measured front propagation speed with the non-dimensional reaction-diffusion (no flow) speed. We analyze all of these results by considering the role of one-way barriers produced by "burning invariant manifolds."[4]

[1]Supported by NSF Grants DMR-1361881, DUE-1317446 and PHY-1156964.
[2]Current address: Point Loma Nazarene University, San Diego, CA
[3]P.W. Megson, M.L. Najarian, K.E. Lilienthal and T.H. Solomon, Phys. Fluids **27**, 023601 (2015).
[4]J. Mahoney, D. Bargteil, M. Kingsbury, K. Mitchell and T. Solomon, Europhys. Lett. **98**, 44005 (2012).

Thomas Solomon
Bucknell University

Date submitted: 30 Jul 2015 Electronic form version 1.4