Abstract Submitted
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Experimental studies of mixing barriers and reaction fronts in a steady, three-dimensional flow[1] HARRISON MILLS, TOM SOLOMON, Bucknell University — We present experiments studying chaotic mixing and front propagation in a steady, three-dimensional (3D) flow composed of nested vortices. Passive mixing is characterized by tracking almost-neutral, fluorescent tracer particles in the flow. A fluorescent dye is also used, and the spreading of this dye is monitored with a scanning laser system and a camera that images a stack of cross-sectional images. Using both methods, we find evidence of both ordered and chaotic regions of mixing in the flow. We also present preliminary results of studies of behavior of the Ruthenium-catalyzed, excitable Belousov-Zhabotinsky chemical reaction in this flow. Propagating fronts of this reaction are characterized in 3D by the same laser-scanning system. The goal of these experiments is to determine barriers to front propagation and to compare these reaction barriers to the barriers observed for passive mixing in the same flow. Ultimately, a generalization of the *burning invariant manifold* theory[2] to 3D will be used to explain these barriers.

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[2]J. Mahoney, D. Bargteil, M. Kingsbury, K. Mitchell and T. Solomon, Europhys. Lett. **98**, 44005 (2012).

Thomas Solomon
Bucknell University

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