Abstract Submitted
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Pinning of reaction fronts by burning invariant manifolds[1] PETER MEGSON[2], TOM SOLOMON, Bucknell University — We present experiments that study the behavior of the excitable Belousov-Zhabotinsky chemical reaction in a translating, regular array of vortices. In a reference frame moving with the translating vortices, the flow is equivalent to a stationary vortex array with an imposed uniform wind. Under a wide range of wind speeds, reaction fronts pin to the vortex flow, neither propagating forward against the wind nor being blown back. We explain this pinning behavior with the use of a recent theory[3] of *burning invariant manifolds* (BIMs) that act as one-way barriers against any propagating reaction front. When the reaction fronts are pinned, several BIMs combine to form an extended barrier that determines the shape of the pinned fronts. The location of the BIMs are calculated numerically with an analytical approximation of the velocity field and are compared with experimental images of the pinned fronts. We also study transient behavior that helps elucidate the one-way nature of the BIMs.

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

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