

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Slow invariant manifolds for reaction-diffusion systems JOSHUA MENGERS, JOSEPH POWERS, University of Notre Dame — Slow Invariant Manifolds (SIMs) are calculated as a reduction technique for isothermal closed reaction-diffusion systems. Reaction-diffusion systems are stiff infinite dimensional dynamical systems that are costly to simulate. These systems' dynamics are reduced by using a Galerkin projection onto a finite-dimensional approximate inertial manifold, and then further reduced by projection onto a low-dimensional SIM. The Galerkin projection rigorously accounts for the coupling of the reaction and diffusion processes. The SIM accurately isolates the system's long time dynamics. A robust method of constructing one-dimensional SIMs by calculating equilibria and then integrating to find heteroclinic orbits is extended to systems with weak spatial heterogeneity. Examples are demonstrated on simple physical reaction mechanisms.

Joshua Mengers
University of Notre Dame

Date submitted: 03 Aug 2011

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