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Multistable Phase Patterns of Spatially Structured Chemical Oscillators MICHAEL GIVER, Iowa State University, DANIEL GOLDSTEIN, BULBUL CHAKRABORTY, Brandeis University — Recent experiments of two-dimensional microfluidic arrays of droplets containing Belousov-Zhabotinsky reactants show a rich variety of spatio-temporal patterns. Using optical techniques a variety of boundary conditions can be set within the system, including finite rings of droplets. These experiments have provided an interesting and easily reproducible system for probing the effects of nonlinearities and fluctuations in a spatially extended system. Motivated by this experimental set up, we study a simple model of chemical oscillators in the highly nonlinear excitable regime in order to gain insight into the mechanism giving rise to the observed multistable attractors. We map the attractor space of a simple two species activator-inhibitor model coupled via three different coupling mechanism: simple inhibitor diffusion, inhibitor diffusion through an inhomogenous medium where active droplets are separated by inactive holding cells, and coupling through diffusion of an inert signaling species, which arrises through a coarse graining of the inhomogenous medium. Once the attractor space of the mean-field level model has been mapped, we check the robustness of the attractors when subject to intrinsic noise.

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