

Abstract Submitted
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Bistability in Inhomogeneity – Effects of Flow Coherent Structures on the Fate of a Bi-stable Reaction¹ ADITYA DHUMUNTARAO, WENBO TANG, Arizona State University — A numerical study on the mixing process of a chemical reaction model between two stable states adjacent to each other in water is presented. The two stable states are equilibria and are homogenized by fluid stirring and diffusion, and settle into a single stable state. With all other parameters fixed, we find the dependence of the final state on the reacting speed. Interestingly, with the existence of coherent structures, at a range of intermediate speeds, the final state also depends on the flow topology. The exact dependence on flow topology is explored in detail. For this bistable reaction, the elliptic flow structures help maintain scalar concentration and preserve the small impurity. These results attribute to the fundamental connection between the underlying flow topology and the domain transitions of dynamic biogeochemical processes.

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