Abstract Submitted
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Transport of an Active Scalar in a Chaotic Flow Field[1] HIMANSHU TIWARI, MARK PAUL, Virginia Tech — We study the active transport of a scalar species in the flow field of Rayleigh-Bénard convection that is exhibiting spatiotemporal chaos. Recent work has quantified the passive transport of a scalar species in a spiral defect chaos flow field to yield enhanced diffusion. In this work we are interested in allowing the scalar species to undergo active transport. For example, the combustion of premixed gases where the scalar quantity can react, or the motion of microorganisms in bioconvection where the scalar quantity can swim in some preferential direction. We use large-scale numerical simulations to solve a reaction-advection-diffusion equation for the scalar species simultaneously with the three dimensional time dependent Boussinesq equations. We use our numerical results to explore the transport of an active scalar species in a variety of chaotic flow fields and over a range of Lewis numbers.

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Himanshu Tiwari
Virginia Tech

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