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**Flow characterization and stability analysis in rectangular lid-driven cavities with particle suspensions** JOHN SHELTON, ABHISHEK SUNKAVALLI, Northern Illinois University — Like the canonical, two-dimensional, square lid-driven cavity problem that serves as its cornerstone, the two-dimensional, rectangular lid-driven cavity is a well-studied extension that also generates dynamically stable, well-defined, flow structures within the laminar flow regimes. Mathematical time-dependent perturbations to these flow structures have been shown to generate a region of metastability as the system transitions towards a turbulent flow regime. By replacing the mathematically-generated, time-dependent perturbations of previous investigations into this phenomena with the particle-fluid and particle-particle interactions present within a multiphase flow, a unique perspective on the stability of these flow structures within the laminar flow regimes of the two-dimensional lid-driven cavity can be obtained. Therefore, the objective of this study is to investigate the effect varying area fractions and relative densities of suspended granular particles have on traditionally laminar and stable flows found at Reynolds numbers of 100, 400, and 1000 of a rectangular lid-driven cavity with an aspect ratio of 1.5. These studies and analyses will aid in the determination how granular materials can be used to enhance desirable flow characteristics of fluid behaviors.

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