Abstract Submitted
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Modeling Two-point Particle Dynamics of Homogeneous Gas-Solid Flows to describe Clustering and Stability[1] ERIC MURPHY, MOHAMMAD MEHRABADI, Iowa State University, SUDHEER TENNETI, CD-Adapco, SHANKAR SUBRAMANIAM, Iowa State University — The stability of a statistically homogeneous gas-solid flow is still incompletely understood in spite of several advances in our understanding of this fundamental problem. The stability of a homogeneous gas-solid flow is closely related to the formation of spatial patterns in the particle field, i.e. clusters. Although the precise definition of stability is lacking, much understanding has been gained through simulation of particle clustering. Previous modeling efforts have focused on the linear stability analysis of mean fields such as number density and mean particle velocity. Resolved simulations representing realizations of the particle field illustrates the importance of particle number fluctuations that occur in all gas-solid systems. These observations highlight the importance of two-particle statistics in analyzing clustering and stability of gas-solid flows. In this talk we present a framework, which may be utilized in modeling the evolution of two-point particle statistics. Using a stochastic particle-based approach to modeling, interaction laws between particles are modeled from DNS statistics. This modeling framework permits the analysis of clustering and stability of homogeneous gas-solid systems while accounting for naturally occurring particle number fluctuations.

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