

Abstract Submitted  
for the DFD08 Meeting of  
The American Physical Society

**Analysis of preferential particle concentration** KARIM SHARIFF,  
NASA Ames — It is known from simulations of particle laden turbulent flows (Squires and Eaton 1991; Wang and Maxey 1993) that particles having a relaxation time nearly equal to the Kolmogorov time preferentially concentrate in regions of weak vorticity. Here we consider the set of equations for *particle dilatation*, strain, and rotation which provides an understanding of this behavior. This set is derived from the two-fluid equations for the coupled fluid and particle phases. Fluid strain induces particle strain, which causes particle dilatation to always decrease. Fluid rotation, on the other hand, induces particle rotation, which causes particle dilatation to always increase. Illustrative solutions are provided for spatially linear flows and the case of pure strain nicely illustrates how particles concentrate. The analysis also suggests devices and flows that would be particularly good at concentrating particles.

Karim Shariff  
NASA Ames

Date submitted: 05 Aug 2008

Electronic form version 1.4