

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Towards understanding of particle-based solar receivers: impact of preferential concentration on heat transfer statistics HADI POURANSARI, ALI MANI, Stanford University — This work aims to develop characterization of heating non-uniformities when a particle-laden fluid is heated via a radiative source. We consider a numerical setting with an inflow-outflow configuration in which a premixed turbulent stream is subject to uniform radiation intensity in the heating section. Direct numerical simulation of fluid-particle mixture is developed using finite difference approximation to the low-Mach Navier-Stokes equations and Lagrangian tracking to represent particle transport. The medium is considered optically thin with all radiation absorbed primarily by solid particles and then exchanged conductively to a gaseous carrier phase. In such setting preferential concentration of the particles leads to heating non-uniformities, which can impact system performance. We will present a characterization of mean versus rms temperature fields for a wide range of Stokes numbers.

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Date submitted: 01 Aug 2014

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