

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Effect on Turbulence Radiation Interaction in Particle Laden Flow¹ MATHEW CLEVELEAND, SOURABH APTE, TODD PALMER, Oregon State University — The effects of Turbulence Radiation Interactions (TRI) in particulate laden flows can significantly influence thermal radiation fields and corresponding material heating. Most combustion problems contain strong heterogeneities which can be treated stochastically. In pulverized coal combustion these heterogeneities include particulate such as coal, fly-ash, and char. This work expands upon a simplified test case, developed by Deshmukh et al. (Proc. Comb. Inst., 2009), to highlight the effects of fuel particulate on TRI phenomena. This includes the decaying isotropic turbulence with a single-step reaction in the presence of solid particulates. Three different test cases were studied: a simplified gas-phase combustion problem without particulate, non-reacting particulate in the gas-phase combustion, a solid-fuel/gas-oxidizer combustion model. Sensitivity of TRI uncertainties such as thermal radiation fields and thermal emission to the presence fuel particulates is investigated in this test problem using direct numerical simulation for the gas-phase and Monte-Carlo approach for the radiative heat transfer.

¹This work was funded by DOE-NETL, program manager Cathy Summers.

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Date submitted: 12 Aug 2011

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