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The Effect of Particles on the Dissipation of Dissipation Coefficient in the k-ε Model JOHN SCHWARZKOPF, CLAYTON CROWE, Washington State University, JAMES RILEY, University of Washington, PRASHANTA DUTTA, Washington State University — A volume average k-ε model for particle laden flows is presented. Recently a turbulent dissipation transport equation was derived to support the TKE equation developed by Crowe and Gillant (1998). To obtain the dissipation model, the coefficients were assumed to be related to those associated with the single phase model yet include effects of the dispersed phase. An analysis shows that four non-dimensional parameters are inherent in modeling particle laden flows: 1) Fluid Reynolds number (Re), 2) Particle Reynolds number (Re_p), 3) Particle mass concentration (C), and 4) Stokes number (St). Direct numerical simulation was used to isolate the effect of stationary particles in homogeneous turbulent decay at low Reynolds numbers (Re = 3.3 and 12.5). The particles were positioned at each grid point and modeled as point forces and a comparison was made between a 64^3 and 128^3 domain. The results show that the dissipation of dissipation coefficient correlates well with the ratio of particle mass concentration to Stokes number (C/St).

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