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Effects of Compressibility on Turbulent Relative Particle Dispersion BHIMSEN SHIVAMOGGI, University of Central Florida — In this paper, phenomenological developments are used to explore the effects of compressibility on the relative particle dispersion (RPD) in 3D fully-developed turbulence (FDT). The role played by the compressible FDT cascade physics underlying this process is investigated. Compressibility effects are found to lead to reduction of RPD, development of the ballistic regime and particle clustering, corroborating the laboratory experiment and numerical simulation results (Cressman et al., 2004) on the motion of Lagrangian tracers on a surface flow that constitutes a 2D compressible subsystem. These formulations are developed from the scaling relations for compressible FDT and are validated further via an alternative dimensional/scaling development for compressible FDT similar to the one given for incompressible FDT by Batchelor and Townsend (1956). The rationale for spatial intermittency effects is legitimized via the nonlinear scaling dependence of RPD on the kinetic energy dissipation rate.

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