Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

A minimal stochastic model capturing intermittency effects on coagulation in turbulence ALAN KERSTEIN, Consultant, STEVEN KRUEGER, University of Utah — A recent theory, confirmed by direct numerical simulation, established that intermittency dominates the early transient period of zero-inertia particle coagulation in inertial-range turbulence [1]. Namely, starting from a monodispersion, the i-mer population increases as a power of time, where the i-dependent exponent involves the third-order scalar structure-function exponent due to the connection between particle number density and an inertial-range passive-scalar field. In effect, scalar intermittency boosts the likelihood that a pairwise coalescence event is promptly followed by another due to 3-particle (hence third-order) correlations. The following minimal model reproduces the exponent values and related properties. The system state is a list of particle locations. The triplet map, a measure-preserving map often used in 1D simulations and newly extended to 3D by applying it to planar slabs instead of line intervals [2], displaces particles within a given slab along the (x, y, or z) coordinate normal to the slab faces. Sampling of map occurrence times and slab orientations, locations, and widths incorporates inertial-range phenomenology. [1] J. Bec et al., Phys. Rev. E 93, 031102(R) (2016). [2] S. K. Krueger, A. R. Kerstein, J. Adv. Model. Earth Sys. 10, 1858-1881 (2018).

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Date submitted: 03 Jul 2019 Electronic form version 1.4