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Clustering of randomly advected low-inertia particles using an economical simulation method[1] JAEKYOON OH, STEVEN KRUEGER, University of Utah, Salt Lake City, UT, ALAN KERSTEIN, Sandia National Laboratories, Livermore, CA — In the EMPM (Explicit Mixing Parcel Model), turbulent advection of fluid is implemented by rearranging the fluid cells. Each permutation represents an individual turbulent eddy, and is called a "triplet map." This implementation of the triplet map captures flow processes as small as the smallest turbulent eddy (Kolmogorov microscale), but the response of small droplets to turbulence has important features at scales as small as the droplet radius. Namely, droplet motion relative to the fluid at scales less than the Kolmogorov microscale induces droplet clustering that is estimated to increase droplet collision rates significantly. We have developed (Kerstein and Krueger 2006), implemented, and tested a 3D triplet map for droplets that captures this clustering effect. There is excellent agreement between our results and DNS (direct numerical simulation) results obtained by Reade and Collins (2000). We are now implementing a collision detection algorithm into the model so that we can simulate collisions and coalescence between finite-inertia particles.

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