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LES of box turbulence with particles: SGS modeling of the particle acceleration[1] REMI ZAMANSKY, IMFT, MIKHAEL GOROKHOVSKI, Ecole Centrale de Lyon — When the Reynolds number is high, the turbulent flow on small length scales is characterized by strong velocity gradients. If such a flow is laden by inertial particles, those gradients, or specifically the turbulent time-scales shorter than the Stokes time, induce fluctuations in the particle motion. In LES, this motivates to simulate the interaction of particle with SGS flow. In our LES of box turbulence with particles, the particle acceleration was decomposed on its resolved and residual parts. The latter was assumed resulting from interactions in the inertial range, and was simulated stochastically along the particle trajectory. It was done by two processes, one for its norm, and another for its direction. Results showed that by introducing the stochastic model for the particle residual acceleration, the particle acceleration statistics from DNS was predicted fairly well. We also proposed the stochastic model for particles bigger than the Kolmogorov size. To this end, the fluctuating drag was derived, and simulated by lognormal process. This model predicted experimental observation: stretched tails in the particle acceleration distribution invariantly to the density and the size of particle.

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Mikhail Gorokhovski
Ecole Centrale de Lyon

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