Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Jammed emulsions via turbulent stirring FEDERICO TOSCHI, IVAN GIROTTO, GIANLUCA DI STASO, KARUN DATADIEN, Eindhoven University of Technology, The Netherlands, ROBERTO BENZI, University of Rome Tor Vergata, Italy, PRASAD PERLEKAR, Tata institute of fundamental research, Hyderabad, India, ANDREA SCAGLIARINI, IAC-CNR, Rome, Italy — Stabilised dense emulsions are common in many foods and cosmetics products (e.g. mayonnaise). Such complex fluids, made of two immiscible fluid components and a stabilizing agent (e.g. surfactant), behave like an elastic solid below a critical yield stress and flow like a viscous fluid above it. More generally, stabilized emulsions display all the rich phenomenology and rheology typical of soft-glassy materials. Stabilized emulsions are often produced via large-scale turbulent stirring. This raises the questions of e.g. how the emulsion structure depends on the turbulent stirring protocol and what are the rheological properties of the obtained emulsion. We employ large-scale 3d direct numerical simulations based on the multi-component Lattice Boltzmann method and second-belt coupling to numerically investigate turbulent emulsification. We show that turbulence is effective in producing a jammed state. We report the protocol followed in order to achieve packing fractions above 70% of the dispersed fluid phase and we characterize the yield stress of the obtained emulsions. In general, our model can be used to investigate catastrophic phase inversion, an event occurring either when the forcing intensity exceeds a threshold value or for excessive depletion of the matrix phase.

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Date submitted: 30 Jul 2019 Electronic form version 1.4