Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Detecting plastic events in emulsions simulations[1] MATTEO LULLI, Univ of Rome Tor Vergata, MATTEO LULLI, MASSIMO BERNASCHI, MAURO SBRAGAGLIA TEAM — Emulsions are complex systems which are formed by a number of non-coalescing droplets dispersed in a solvent leading to non-trivial effects in the overall flowing dynamics. Such systems possess a yield stress below which an elastic response to an external forcing occurs, while above the yield stress the system flows as a non-Newtonian fluid, i.e. the stress is not proportional to the shear. In the solid-like regime the network of the droplets interfaces stores the energy coming from the work exerted by an external forcing, which can be used to move the droplets in a non-reversible way, i.e. causing plastic events. The Kinetic-Elasto-Plastic (KEP) theory is an effective theory describing some features of the flowing regime relating the rate of plastic events to a scalar field called fluidity $f = \frac{\dot{\gamma}}{\sigma}$, i.e. the inverse of an effective viscosity. Boundary conditions have a non-trivial role not captured by the KEP description. In this contribution we will compare numerical results against experiments concerning the Poiseuille flow of emulsions in microchannels with complex boundary geometries. Using an efficient computational tool we can show non-trivial results on plastic events for different realizations of the rough boundaries.

[1]The research leading to these results has received funding from the European Research Council under the European Communitys Seventh Framework Programme (FP7/2007- 2013)/ERC Grant Agreement no. [279004]

Matteo Lulli
Univ of Rome Tor Vergata

Date submitted: 25 Jul 2016 Electronic form version 1.4