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A kinetic theory of plastic flows in jammed materials[1] LYDERIC BOCQUET[2], University of Lyon, France, ANNIE COLIN, LOF, University Bordeaux 1, ARMAND AJDARI, ESPCI, Paris, France — Amorphous jammed materials of diverse nature display complex flow properties intermediate between solid and liquid, as characterized by the existence of a yield stress. Furthermore flows in such systems usually exhibit spatial inhomogeneities, which cannot be reconciliated with classical rheological descriptions. We present a novel kinetic approach for the elasto-plastic flow dynamics of jammed materials, describing the spatio-temporal collective dynamics of the localized plastic events occuring during the flow [1]. This description yields a non-local constitutive law for the flow, introducing as a key dynamic quantity the local rate of plastic events. This quantity, interpreted as a local fluidity, is spatially correlated with a correlation length diverging in the quasistatic limit, i.e., close to yielding. In line with recent experimental [2] and numerical observations, we predict finite size effects in the flow behavior, as well as the absence of an intrinsic local flow curve.

[1] L. Bocquet, A. Colin, A. Ajdari, *Phys. Rev. Lett.* (2009) in press
[2] J. Goyon, A. Colin, G. Ovarlez, A. Ajdari, L. Bocquet, *Nature* **454** 84 (2008)

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[2]http://lpmcn.univ-lyon1.fr/∼lbocquet

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