SACLAY

DIRECTION DES SCIENCES DE LA MATIERE,
DEPARTEMENT DE RECHERCHE SUR L'ETAT CONDENSE,
LES ATOMES ET LES MOLECULES,
SERVICE DE PHYSIQUE ET DE CHIMIE DES SURFACES ET DES INTERFACES

SEMINAIRE *

Vendredi 25 mai 2007 à 11h00
Bâtiment 466, salle 111 - CEA Saclay, 91191, Gif sur Yvette

Dynamical noise and avalanches in quasi-static plastic flow of amorphous solids

A. LEMAITRE

LMSGC, Laboratoire Central des Ponts & Chaussées, Champs sur Marnes

Invité par E. Bouchaud

Résumé:

We will review recent results on amorphous systems subjected to simple shear in the athermal, quasistatic limit. The athermal quasistatic trajectories are shown to separate into smooth, reversible elastic branches which are intermittently broken by discrete catastrophic plastic events. Atomistic computer simulations indicate that these events present a broad distribution of sizes, and can be seen as self-induced avalanches of local elementary rearrangements. Strikingly, data obtained using differing interaction potentials can be brought into quantitative agreement after a simple rescaling, emphasizing the insensitivity of the emergent plastic behavior in these disordered systems to the precise details of the underlying interactions: the results should be relevant to understanding plastic behavior in systems such as colloidal or metallic glasses well below their glass temperature, soft glassy systems (such as dense emulsions), or compressed granular materials. A mean-field model of plasticity is then analysed, based on the dynamics of an ensemble of shear transformation zones, interacting only via intrinsic dynamical noise generated by the flips themselves. The model captures the emergence of avalanches, yet with scaling properties which are highly sensitive to the description of elastic couplings. This suggests that non-affine strain fields might be of paramount importance in the small systems accessible to molecular simulations.

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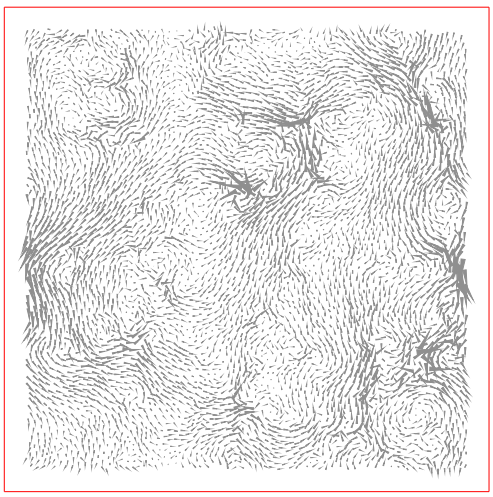

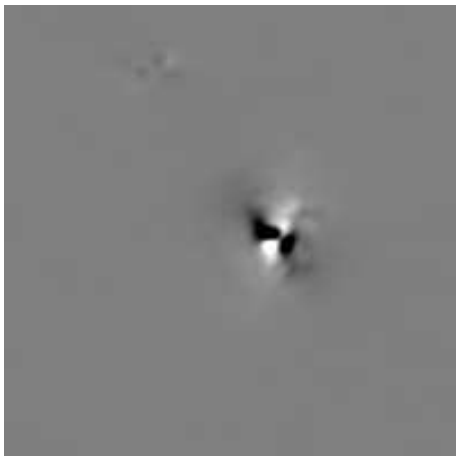

*** SERA PRECEDE D'UNE PAUSE-CAFE A PARTIR DE 10H30**

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