

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Random Organization and Irreversibility at Plastic Depinning

CHARLES REICHHARDT, CYNTHIA REICHHARDT, Los Alamos National Laboratory — We provide evidence that plastic depinning falls into the same class of phenomena as the random organization which was recently studied for periodically driven particle systems by L. Corte *et al.* [Nature Phys. **4**, 420 (2008)]. In the plastic flow system that we consider, the pinned regime corresponds to a quiescent state while the moving regime corresponds to a fluctuating state. Upon the sudden application of an external force, the system organizes into one of these two states and the time scale required to reach the final state diverges as a power law when approaching a nonequilibrium transition. We propose a simple experiment to test for this transition in colloidal systems with random disorder and in superconducting vortex systems.

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Date submitted: 21 Nov 2008

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