Abstract Submitted
for the SES14 Meeting of
The American Physical Society

Effect of current quenches on the dynamics of magnetic flux lines in type-II superconductors[1] HARSH CHATURVEDI, HIBA ASSI, Department of Physics, Virginia Tech, ULRICH DOBRAMYSL, Mathematical Institute, University of Oxford, MICHEL PLEIMLING, UWE TÄUBER, Department of Physics, Virginia Tech — The mixed phase in type-II superconductors is characterized by the presence of mutually repulsive magnetic flux lines with normal cores. While external currents drive these vortices via the Lorentz force, material defects (point-like or extended) in the superconducting material act as pinning centers for them. We describe the disordered vortex system with an elastic line model, whose dynamics we investigate numerically by means of Langevin Molecular Dynamics. We specifically study the effects of sudden changes of the driving current on the time evolution of the mean flux line gyration radius and the associated transverse displacement correlation functions. Within the moving phase, we obtain fast exponential relaxation to a new non-equilibrium stationary state. Upon quenching from the moving into the pinned glassy phase, we observe algebraically slow relaxation kinetics, with the associated breaking of time translation invariance and indications of aging scaling behavior.

[1]Research supported by the U.S. Department of Energy, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering under Award DE-FG02-09ER46613.

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Date submitted: 02 Oct 2014 Electronic form version 1.4