Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Effects of magnetic field quenches on the relaxation dynamics of vortex lines in disordered type-II superconductors[1] HIBA ASSI, HARSHWARDHAN CHATURVEDI, MICHEL PLEIMLING, UWE C. TÄUBER, Department of Physics, Virginia Tech, ULRICH DOBRAMYSL, Mathematical Institute, University of Oxford — Understanding the relaxation dynamics of vortex matter in disordered type-II superconductors from experimentally realizable initial conditions may improve material characterization and optimization for technological applications. We model magnetic flux lines in the London limit as interacting directed elastic lines subject to uncorrelated point-like or extended columnar pinning centers. We employ a Langevin Molecular Dynamics algorithm to simulate the vortex dynamics. We analyze the vortex relaxation kinetics following sudden magnetic field changes by instantaneously adding or removing lines from the system at random. By studying two-time correlation functions such as the mean-square displacement and height autocorrelation function, as well as one-time observables such as the ratio of pinned line elements and radius of gyration, we disentangle the effects of the competing repulsive vortex interaction and pinning and we compare the distinct relaxation properties due to the type of disorder. We discovered some universal features regardless of the type of quench and the presence of vortex interactions, and others that are dependent on the type of disorder and the system's initial conditions.

[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: 04 Nov 2014 Electronic form version 1.4