

Dynamics of vortex matter and the peak effect

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Abstract

We study numerically and experimentally the dynamics of driven vortex matter. Our London-Langevin simulations find that the critical current exhibits a peak effect both across the Bragg glass to vortex glass transition and across the melting line. The peak is accompanied by a clear crossing of the I-V curves. We report transport measurements on untwinned YBCO crystals, in complete accordance with these findings. At higher drives disorder is averaged to reduced values, and the vortices reorder into a “moving solid”. The effect of the disorder can be well represented with a “shaking temperature”, which is inversely proportional to the velocity.