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In-Field Critical Current by Correlated Anti-Pins in Type-II Superconductors[1] ERIC J. OSWALD, JOSE P. RODRIGUEZ, Physics & Astronomy, California State University at Los Angeles — The critical current shown by films of $YBa_2Cu_3O_y$ that contain naturally occuring linear pinning centers aligned parallel to the c-axis decays with increasing magnetic field that is also aligned in parallel as an inverse-square-root power law. Recent theoretical work based on 2D collective pinning of the vortex lattice by such material line defects recovers this dependence on magnetic field in the weak-pinning limit[1]. It further predicts an in-field critical current for correlated *antipins* that decays with magnetic field more slowly, as an inverse power law characterized by an exponent below 1/2. We test these predictions by performing Langevin dynamics simulations of the corresponding 2D vortex lattice driven by the Lorentz force. Long-range logarithmic interactions between vortices are assumed, while (anti)pinning centers are arranged in a "liquid" fashion. We find indeed that collective pinning by antipins result in a significant critical current. More detailed comparisons with theory in relation to the power-law decay with magnetic field will be made.
[1] J.P. Rodriguez and M.P. Maley, Phys. Rev. B **73**, 094502 (2006).

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