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Phase diagram of the vortex system in layered superconductors with random pinning CHANDAN DASGUPTA, Indian Institute of Science, ORIOL T. VALLS, University of Minnesota — Density functional theory based on a model free energy functional is used to study structural and thermodynamic properties of the vortex system in highly anisotropic layered superconductors with random pinning. For low concentrations of random columnar pins perpendicular to the layers, we find three distinct phases: a topologically ordered Bragg glass, a polycrystalline Bose glass and a vortex liquid. As the temperature is increased, the low-temperature Bragg glass transforms into the vortex liquid in two steps: these two phases are separated by a small region of the Bose glass phase. The Bragg glass phase disappears as the pin concentration is increased and the two-step first-order melting found at low pin concentrations is replaced by a single continuous transition from the Bose glass to the vortex liquid. This transition corresponds to the onset of percolation of liquid-like regions across the system. Results obtained from similar calculations for systems with random point pinning will also be presented.

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