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Static and dynamic properties of pinned flux-line liquids A.M. ETTOUHAMI, University of Florida — We study the equilibrium statics and nonequilibrium driven dynamics of flux line liquids in presence of a random pinning potential. Under the assumption of replica symmetry, we find in the static case using a replica Gaussian variational method that the only effect of disorder is to increase the tilt modulus and the confining "mass" of the internal modes of the flux lines, thus decreasing their thermal wandering. In the nonequilibrium, driven case, we derive the long scale, coarse-grained equation of motion of the vortices in presence of disorder, which apart from new Kardar-Parisi-Zhang nonlinearities, has the same form as the equation of motion for unpinned vortices, with renormalized coefficients. This implies, in particular, that the structure factor of a disordered vortex liquid has the same functional form as in the absence of pinning. The expression of the static structure factor derived within our approach is consistent both with experimental data and with the standard theory of elasticity of vortex lattices.

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