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Vortex Dynamics in Ferromagnetic Superconductors: Excitations of Domain Walls and Enhanced Viscosity SHIZENG LIN, LEV BULAEVSKII, CRISTIAN BATISTA, Theoretical division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545 — As more and more superconductors with coexisting magnetic order are found in the last decades, understanding of the vortex dynamics in these superconductors becomes a relevant issue [1, 2]. We investigate vortex dynamics in ferromagnetic superconductors both numerically and analytically. Driven by the Lorentz force, the vortices perturb the magnetic moments and excite magnons. At some velocities, the motion of vortices is resonant with magnetic moments, and the amplitude of magnon excitation is enhanced. When the relaxation rate of magnon is smaller than the pumping rate, the magnon becomes unstable and domain walls are created. The domain walls interact strongly with vortices motion and greatly enhance the viscosity of vortices. Depending on the density of vortices, the vortex configuration may be modulated by the magnetic system. The underlying dynamics of the vortices and magnetic moments can be probed by transport measurement.

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