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A quantitative model for flux flow resistivity and Nernst effect of vortex fluid in high-temperature superconductors RONG LI, ZHEN-SU SHE, College of Engineering, Peking University, LAN YIN, School of Physics, Peking University, STATE KEY LABORATORY FOR TURBULENCE AND COMPLEX SYSTEMS TEAM — Transport properties of vortex fluid in high-temperature superconductors have been described in terms of viscous dynamics of magnetic and thermal vortices. We have constructed a quantitative model by extending the Bardeen-Stephen model of damping viscosity to include the contributions of flux pinning in low temperature and vortex-vortex interaction in high magnetic field. A uniformly accurate description of flux flow resistivity and Nernst signal is achieved for empirical data over a wide range of temperature and magnetic field strength. A discrepancy of three orders of magnitude between data and Anderson model of Nernst signal is pointed out, suggesting the existence of anomalous transport in high-temperature superconductor beyond mere quantum and thermal fluctuations. The model enables to derive a set of physical parameters characterizing the vortex dynamics from the Nernst signal, as we illustrate with an analysis of six samples of $Bi_2Sr_{2-y}La_yCuO_6$ and $Bi_2Sr_2CaCu_2O_{8+\delta}$.

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