

Image of the Vortex Avalanches in MgB₂

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The snow falling in a mountain is known to be a good example of the avalanche but realization of this in a regular laboratory is not simple. Here I like to introduce the magneto-optical (MO) image of the vortex avalanche which can be visualized in a laboratory. This vortex avalanche is observed in only a limited number of type-II superconductors and is originated from the thermo-magnetic instabilities generated by vortex motion. A theoretical analysis of the coupled Maxwell and thermal diffusion equations predicts that the heat diffusion should be much slower than the magnetic vortex diffusion in a vortex avalanche. So far, this phenomenon has been strongly observed in MgB₂ thin films because of its high critical current density and low thermal conductivity for $T < 10$ K and $H < 1500$ Oe. Details will be explained.

keywords : Vortex, Avalanche, MgB₂, Magneto-Optics