

## Non-equilibrium critical vortex dynamics of disordered 2D XY-model

Aging and memory effects are nontrivial features in the non-equilibrium behavior of systems with slow dynamics. At slow evolution from a non-equilibrium initial state, the aging of a system is manifested in slowing down relaxation processes with the time passing from the preparation of a sample (its "age") and is accompanied by the violation of the fluctuation-dissipation theorem. A significant interest has been recently focused on non-equilibrium processes in magnetic materials.

Non-equilibrium critical behavior of structurally disordered planar magnets described by the two-dimensional XY-model has been studied by Monte-Carlo methods. For systems evolving from a high-temperature non-equilibrium initial state, the influence of defects of the structure on aging effects, as well as the violation of the fluctuation-dissipation theorem for quenching temperatures in the low-temperature phase, has been analyzed. Power law temperature dependences of the limiting values of the fluctuation-dissipation ratio have been revealed for the first time.

Non-equilibrium memory effects has been investigated from fluctuation-dissipation ratio. It was found that non-equilibrium critical coarsening of vortex subsystem lead to presence of quasi-long-range order. Critical slowing down effects of coarsening growth in disordered system caused by vortex pinning on impurities. The temperature dependences of the spin stiffness for disordered systems were calculated. Using this dependences it were determined temperature ranges of applicability of the spin-wave approximation and temperatures of Beresinskii-Kosterlitz-Taules transition of disordered 2D XY-model with various spin concentration.

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