

ON THE SYMMETRY OF A PREISACH MAP

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After the FORC diagrams were introduced as a tool to characterize hysteretic samples, it quickly turned out, that they are not the same as the Preisach maps. The source of confusion are two observations:

- the Preisach maps have mirror symmetry with respect to the axis $H_{\text{up}} = -H_{\text{down}}$ while FORC diagrams are often asymmetric, and
- the FORC diagrams' amplitudes are sometimes negative, beyond any experimental uncertainties, while the amplitudes on the Preisach maps are expected to be non-negative, since they are the probability density amplitudes.

A simple and convincing example is presented, showing that the mirror symmetry of the Preisach map is in reality an exception rather than the rule. This paper is a first step towards the unification of both, FORC and Preisach, models of hysteresis. After this is done, the framework of a reworked/reinterpreted Preisach model should gain the capacity to accurately describe, in a unique way, the exchange biased static hysteresis loops, as well as those exhibiting unusual effect of negative remanence. Such a generalized model of hysteresis should be equally applicable to other classes of materials, like superconductors, (multi)layered structures, nanocrystalline materials, patterned media, etc.

13.4 cm

Subject category :

6. Theory of Magnetism

Presentation mode :

oral

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9.7 cm