Anhysteretic Functions for the Jiles-Atherton Model

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The Jiles-Atherton (JA) model of ferromagnetic hysteresis usually bases on the Langevin function as its anhysteretic part. This leads to a problem, since for some known materials the anhysteretic curve may not be modeled in view of fact, that the coupling parameter α, as determined from their major hysteresis loop, is too large, i.e. greater than the value permissible for the Langevin function. Therefore a new function is required in order to omit this mathematical dilemma. Here we present a set of simple functions, with their knees depending on one parameter only. Also a more complicated function, with knee location depending on two parameters is analyzed – however the Brillouin function again does not solve the difficulty with α. Therefore, within the frame of JA model, a new function is proposed, making possible to have the initial differential susceptibility arbitrarily small. Moreover the strenghtening of the effective field is taken into account and the permissible values of the second coupling parameter β, in respect to the Brillouin and Langevin functions, are presented. Finally, our new function is successfully used to model the measured anhysteretic curve.