The advantages and drawbacks of the Jiles-Atherton model

THE 40-year-old Jiles-Atherton (JA) model still remains one of the most widely used descriptions of hysteresis loops. It is a low dimensional model, based on some physical premises generally accepted by the scientific community. Its popularity stems – among others – from a relatively simple mathematical form of its equations and physical interpretation attributed to its parameters. It should be remarked that this formalism has been applied to describe the phenomenon of paramount practical importance, namely the magneto-mechanical coupling in electrical steels.

The aim of the present paper is to point out some inconsistencies inherent in JA formalism. Some alternative approaches to describe quasi-static hysteresis loops of soft ferromagnetic materials are pointed out, namely the Harrison model, the GRUCAD approach or the phenomenological T(x) description. This presentation briefly reviews about 15 years of work on hysteresis modeling carried out by its author.

Krzysztof Chwastek was born in Częstochowa, Poland in 1972. He received his M.Sc. (1997), PhD (2007) and D.Sc. (habilitation) degrees (2013), all in electrical engineering from Faculty of Electrical Engineering, Częstochowa University of Technology. He is currently a university professor at the parent institution. His research interests are focused on magnetic materials and their characterization. His surname appears in the ranking of world's top 2% most-cited scientists compiled by Stanford University.

 ISBN 978-86-7466-970-9