



Investigation of elastic stress – induced magnetic changes in a low carbon steel by an integrated Barkhausen pulse height distribution technique: Some novel aspects and operational approaches

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Abstract

An integrated Barkhausen pulse height distribution (i-PHD) technique was used to reveal and characterize some interesting elastic stress - induced quantitative and qualitative subtle changes of micromagnetic activity. The quantitative changes consist in a domain wall multiplication whereas the qualitative in a formation of two major modes of domain wall motion. Concerning the first kind of changes, it was shown that the experimentally obtained low limit of elastic stress at which such micromagnetic changes may occur, are in reasonable agreement with existing theoretical as well as experimental results. Concerning the second kind of changes, it was shown that by means of three types of distribution approach, these two modes of wall motion can be related to the grain boundaries as well as the grain interior micromagnetic activity. In this context, it was also shown that an increase in the supplied elastic strain leads to a broadening of both distribution modes.