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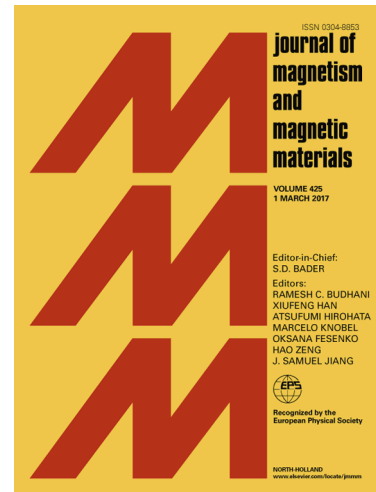
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Dynamic properties of micro-magnetic noise in soft ferromagnetic materials

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Abstract

Dynamic response of magnetic hysteresis, magnetic Barkhausen noise and magneto-acoustic emission in a soft ribbon and electrical steels was studied comprehensively. The measurements were performed under controllable magnetization conditions: sinusoidal/triangular waveforms of the magnetic induction and a triangular waveform of the magnetic field. Magnetizing frequency was varied in a wide range: $f_{mag} = 0.5 - 500$ and $0.1 - 100$ Hz for the ribbon and the electrical steels, respectively. Magnetization amplitude was fixed on a near-saturation level $H_{max} \simeq 100$ A/m. Barkhausen noise signal was detected by a sample-wrapping/surface-mounted coil and differently filtered. It was found that intensity of the Barkhausen noise rises approximately as a square root function of the magnetizing frequency. Whereas, level of the magneto-acoustic emission follows the hysteresis loss trend with an additional linear term (classical loss component).

Keywords: Magnetization dynamics, Barkhausen noise, Magneto-acoustic emission, Magnetic hysteresis, Electrical steel

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