Circular Magnetization Reversal in Cylindrical Magnetic Wire

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Abstract. Circular magnetization reversal in cylindrical amorphous wire $Co_{72.5}Si_{12.5}B_{15}$ with negative magnetostriction constant under applied tensile stress was investigated. Hysteresis loops of axial magnetization and circular magnetic flux showed presence of helical anisotropy with slight deviation from the circular direction. Circular magnetization reversal was studied using rectangular electric current pulses. Critical electric current (circular magnetic field) under which circular magnetization did not change with application of long current pulses was experimentally determined. If a single boundary (domain wall) between circular domains was created, then linear time dependence of circular magnetization changes versus length of current pulse of constant magnitude was observed. It is probable that the circular magnetization reversal was due to propagation of a single domain wall. Based on this assumption, domain wall velocity was determined. Linear dependence of domain wall velocity versus current magnitude was observed. The slope of this dependence is in good agreement with theoretical predictions based on eddy-current damping. In conclusion, it appears that experiments with a single domain wall are possible in wires with a high value of negative magnetostriction.