SUPERSONIC DOMAIN WALL IN FERROMAGNETIC MICROWIRES

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The domain wall propagation is used in different devices to store (race-track memory [1]) or transfer (domain wall logic [2]) information. The domain wall is driven either by magnetic field or by electric current. In both cases, the speed of such devices depends directly on the propagating domain wall velocity.

Amorphous glass coated microwires with positive magnetostriction are ideal material for study the single domain wall dynamics [3]. Due to their low anisotropy, the studied domain wall is very fast [4], even exceeded the sound velocity in magnetic microwire [5]. Such fast domain wall brings new unexpected effects that could occur its propagation.

Here, we present a single domain wall dynamics study on amorphous glass-coated microwires with different composition. The maximum velocities obtained in our measurement exceeded few times the sound velocity. We try to explain the existence of such fast domain wall in terms of presence of two perpendicular (however low) anisotropies, as well as the presence of the outer radial domain structure that shields the domain wall from the pinning on the surface. Moreover, due to the presence of magnetoelastic anisotropy, the interaction of the domain wall with the phonons can be recognized, when the domain wall overcomes the sound velocity.

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