Domain Wall Dynamics in Notched Ferromagnetic Nanowires

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SUMMARY

Ferromagnetic nanowires have promising applications in data storage. In such devices, the information is encoded by Domain Walls (DW) which are thin zones of magnetization reversal. The magnetization behavior is described by the non linear Landau-Lifschitz model.

We study the dynamics of a DW submitted to an applied magnetic field in an infinite-length ferromagnetic nanowire presenting one notch. First, we highlight DW-pinning properties of the notch, and DW-depinning effects of applied magnetic field. We establish also that when the applied field tends to push the wall far away from the notch, its dynamics are asymptotically close to those in an unnotched wire.

Keywords: ferromagnetic nanowire, Landau-Lifshitz equation, asymptotic stability

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