Curvature-induced emergence of a second critical field for domain wall dynamics in bent nanostripes

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Abstract
We investigate the dynamics of a transverse domain wall (DW) in a bent nanostripe under an external field and spin-polarized current. Besides the standard Walker breakdown phenomenon, we show the emergence of a second Walker-like critical field, which depends on both the curvature of the nanostripe and its cross section geometry. At this field, DW can change its phase, i.e., can be re-oriented along another direction with respect to the nanostripe face. Additionally, we show that the amplitude and frequency of the DW oscillations above the Walker breakdown field also depend on the nanostripe geometry and can be controlled by external stimuli. Our results evidence that the inclusion of local curvatures in nanostripes is an important component for applications that demand an adequate control of the DW phase by the proper choice of external stimuli.

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