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Strain induced parametric pumping of a domain wall and its depinning from a notch[1] RABINDRA NEPAL, UTKAN GUNGORDU, ALEXEY KOVALEV, University of Nebraska - Lincoln — Using Thiele's method and detailed micromagnetic simulations, we study resonant oscillation of a domain wall in a notch of a ferromagnetic nanowire due to the modulation of magnetic anisotropy by external AC strain. Such resonant oscillation results from the parametric pumping of domain wall by AC strain at frequency about double the free domain wall oscillation frequency, which is mainly determined by the perpendicular anisotropy and notch geometry. This effect leads to a substantial reduction in depinning field or current required to depin a domain wall from the notch, and offers a mechanism for efficient domain wall motion in a notched nanowire. Our theoretical model accounts for the pinning potential due to a notch by explicitly calculating ferromagnetic energy as a function of notch geometry parameters. We also find similar resonant domain wall oscillations and reduction in the domain wall depinning field or current due to surface acoustic wave in soft ferromagnetic nanowire without uniaxial anisotropy that energetically favors an in-plane domain wall.

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