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Notch-Boosted Domain Wall Propagation in Magnetic Nanowires[1] XIANG RONG WANG, Hong Kong University of Science and Technology, HAUIYANG YUAN, Hong Kong Univ of Sci Tech — Magnetic domain wall (DW) motion along a nanowire underpins many proposals of spintronic devices. High DW propagation velocity is obviously important because it determines the device speed. Thus it is interesting to search for effective control knobs of DW dynamics. We report a counter-intuitive finding that notches in an otherwise homogeneous magnetic nanowire can boost current-induced domain wall (DW) propagation. DW motion in notch-modulated wires can be classified into three phases: 1) A DW is pinned around a notch when the current density is below the depinning current density. 2) DW propagation velocity above the depinning current density is boosted by notches when non-adiabatic spin-transfer torque strength is smaller than the Gilbert damping constant. The boost can be many-fold. 3) DW propagation velocity is hindered when non-adiabatic spin-transfer torque strength is larger than the Gilbert damping constant.

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