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Domain Wall Nucleation and Propagation within Ferroelectic Nanowires in High Strength Electric Fields[1] KEVIN MCCASH, University of South Florida, ARVIND SRIKANTH, University of Illinois at Urbana-Champaign, INNA PONOMAREVA, University of South Florida — Ferroelectric nanowires have attracted a lot of attention recently, thanks to their ability to develop electric polarization at the nanoscale [1]. Such a unique feature could potentially lead to the use of such nanowires in nanoscale, ultra fast, high-density memory elements. Here we take advantage of accurate first-principles-based simulations to study ultra fast polarization reversal in ultra thin ferroelectric nanowires made of $PbTi_{0.6}Zr_{0.4}O_3$ alloy. Our computational experiments reveal that polarization reversal in such nanowires is both qualitatively and quantitatively different from their bulk counterparts and exhibits unique features that could find potential use in nanoscale ferroelectric memory elements.

[1] P.M. Rørvik, T. Grande, and M.-A. Einarsrud (2011), One-Dimensional Nanostructures of Ferroelectric Perovskites. Advanced Materials, 23: 4007-4034

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