

# Effect of cross-sectional vortex formation on magnetization reversal in rectangular shaped Permalloy nanowires

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## Abstract

In order to pinpoint the different factors responsible for magnetization reversal, we performed simulation using OOMMF micromagnetic package for rectangular shaped permalloy element having length of  $1\mu\text{m}$ , width 50-100 nm and thickness 15-80 nm with length to width ratio  $L/W > 4$ . Interestingly an increase in coercivity with thickness is found for every width below a critical thickness. With increasing width and thickness, the distinct behavior of coercivity, hysteresis loops and reversal mechanism are presented. Vortex end domains are observed during the magnetization reversal beyond particular thickness, where the three dimension reversal mechanism is expected to begin, causing a sudden increase in coercivity.

