Domain wall logics in coupled bent ferromagnetic nanofibers

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Magnetic nanofibers can be used for data transport and storage, especially related to the emerging field of neuromorphic computing [1,2]. Domain walls in bent nanofibers can nucleate, e.g., due to rotating local magnetic fields. Their propagation through bent nanofibers, however, depends on the bending direction in correlation to the rotational orientation of the magnetic field, making such nanofibers suitable for semi-deterministic logic operations. Here we report on domain wall nucleation, propagation and annihilation in bent nanowire networks with multiple data inputs and outputs. Our results show that for a minimum of three coupled nanowires, logic operations become possible, while four nanowires show a broad spectrum of logic operators in the corresponding truth tables. Based on these dynamic micromagnetic simulations, we suggest possible architectures of nanowire-based logics.

References:

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