Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Skyrmion motion induced by plane stress waves[1] UTKAN GUNGORDU, ALEXEY A. KOVALEV, Univ of Nebraska - Lincoln — Skyrmions are typically driven by currents and magnetic fields. We propose an alternative method of driving skyrmions using plane stress waves in a chiral ferromagnetic nanotrack. We find that the effective force due to surface acoustic waves couples both to the helicity and the topological charge of the skyrmion. This coupling can be used to probe the helicity of the skyrmion as well as the nature of the Dzyaloshinskii-Moriya interaction. This is particularly important when a ferromagnet lacks both surface- and bulk-inversion symmetry. Plane stress waves can be generated using a pair of interdigital transducers (IDTs). As the nanowire is subject to half-open space boundary conditions, the skyrmion is driven by normal stress in this setup. We find that skyrmions get pinned at the antinodes of the stress wave, much similar to domain walls, which enables skyrmion motion by detuned IDTs. We also consider a nanotrack sandwiched between a piezoelectric layer and a substrate, with electrical contacts placed on top, which results in shear stress in addition to normal stress in nanotrack. We find that unlike domain walls, skyrmions can be driven using shear component of a standing stress wave.

[1]This work was supported primarily by the DOE Early Career Award DE-SC0014189, and in part by the NSF under Grants Nos. Phy-1415600, and DMR-1420645 (UG)

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Date submitted: 11 Nov 2016 Electronic form version 1.4