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[615] Non-reciprocal magnonic directional coupler

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We use a bilayer of YIG/CoFeB to construct waveguides of the directional coupler to induce non-reciprocity in the spin-wave propagation and add new functionalities to the directional coupler. The non-reciprocity due to the symmetry breaking leads to Δk being different in the two propagation directions when magnetized in the Damon-Eschbach configuration ($+k$ $-k$). Therefore, the coupling length differs in the two directions. At a frequency, where $L_{-k}=2L_{+k}$, the directional coupler operates as a Y-circulator. The spin-wave dispersion curves are numerically investigated in nm-thick bilayers of YIG(100)/CoFeB(40) and YIG(100)/SiO₂(5)/CoFeB(40) plane films as well as in nano-scale waveguides and measured using Ferromagnetic Resonance (FMR) spectroscopy and k-resolved Brillouin Light Scattering (BLS) spectroscopy.

Theoretical Work

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