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Spin-Orbit Torque Control of Dipole Field-Localized Spin Wave Modes. CHI ZHANG, YONG PU, SERGEI A. MANUILOV, SHANE P. WHITE, MICHAEL R. PAGE, ERICK C. BLOMBERG, DENIS V. PELEKHOV, CHRIS HAMMEL, The Ohio State University — Auto-oscillation of a ferromagnet due to spin-orbit torques in response to a dc current is of wide interest as a flexible mechanism for generating controllable high frequency magnetic dynamics. We use localized spin wave modes that are confined by strongly inhomogeneous dipole magnetic field of a nearby micromagnet to manipulate their response to spin-orbit generated spin currents. This provides variable spatial confinement and systematic tuning of magnon spectrum, which offers a new approach to study the impact of multi-mode interactions on auto-oscillations by continuously tuning the spectral separations of dipole field-localized modes. Here we first demonstrate electrical spin-torque ferromagnetic resonance (ST-FMR) detection of well-resolved dipole field-localized modes in a Py/Pt strip. We observe clear damping control, and find that localized modes can be controlled as efficiently as the uniform mode. We further drive localized modes into auto-oscillations with dc current only. We study their characteristic behaviors, and discuss the role of reduced scattering channels.

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