Terahertz Spin-Wave Emission from Ferrimagnetic Domain walls

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Recently, antiferromagnetic spintronics has attracted much attention due to spin excitation in the terahertz (THz) ranges [1]. It has been recently predicted that spin-orbit torque (SOT) combined with interfacial Dzyaloshinskii-Moriya interaction effectively drives an antiferromagnetic domain wall which can emit THz spin waves [2]. Because of the immunity of antiferromagnets to external magnetic fields, however, it is experimentally challenging to create and detect antiferromagnetic domain walls. In this talk, we report theoretical and numerical results on field-driven THz spin wave emission from a ferrimagnetic domain wall which is easy to manipulate thanks to net non-zero magnetic moment. In addition, we show that THz spin wave emission is realized by SOT as well. We focus on a class of ferrimagnets composed of antiferromagnetically coupled two inequivalent sublattices having different Lande-g factor. In this class of ferrimagnets, the angular momentum compensation temperature T_A is different from the magnetic moment compensation temperature T_M . Because of this difference between two compensation temperatures, the field-driven antiferromagnetic spin dynamics is realized for ferrimagnetic domain walls at T_A [3], opening the possibility for field-driven THz spin-wave emission. In the presentation, we will show detailed theoretical and numerical results for field- and SOT-driven dynamics of ferrimagnetic domain wall.

References

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