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Spin wave mode coexistence: A consequence of the Oersted field induced asymmetric energy landscape RANDY DUMAS, EZIO IACOCCA, Univ. of Gothenburg, STEFANO BONETTI, Stanford Institute for Energy and Materials Science , SOHRAB SANI, MAJID MOHSENI, ANDERS EKLUND, JOHAN PERSSON, Royal Institute of Technology (KTH), OLLE HEINONEN, Argonne National Laboratory, JOHAN AKERMAN, Univ. of Gothenburg — The emerging field of magnonics relies on the systematic generation, manipulation, and detection of spin waves (SWs). Nanocontact spin torque oscillators (NC-STOs) provide an ideal platform to study spin transfer torque induced SW emission [1,2]. In analogy to two species competing for the same food supply it has been argued that only one SW mode can survive in the steady state [3]. However, as evidenced in many experiments clear signatures of mode-hopping are often observed [1,4]. We present a third possibility, namely that under the correct experimental conditions, mode coexistence can be realized. Micromagnetic simulations reveal that the SW modes are spatially separated under the NC. Mode coexistence is facilitated by the local field asymmetries induced by the spatially inhomogeneous Oersted field in the vicinity of the NC and further promoted by SW localization. Finally, both simulation and experiment reveal a weak low frequency signal exactly at the difference of the mode frequencies, consistent with inter-modulation of two coexistent modes.
[1] S. Bonetti, et al., PRL 105, 217204 (2010). [2] M. Madami, et al., Nature Nanotechnol. 6, 635 (2011). [3] F. M. de Aguiar, et al., PRB 75, 132404 (2007). [4] P. K. Muduli, et al., PRL 108, 207203 (2012).

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