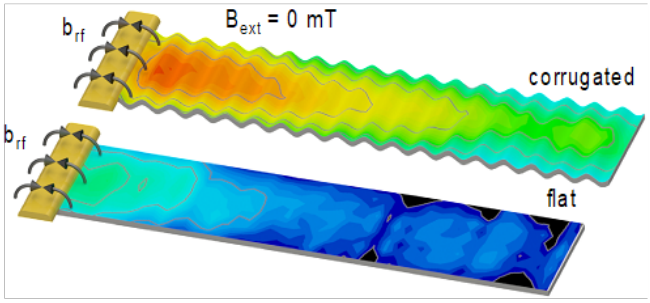
Propagation, refraction and steering of spin waves in materials with locally controlled magnetic anisotropy

M. Urbánek[1]

[1]*CEITEC Brno University of Technology, Brno, Czech Republic*

One of the elementary premises of complex magnonic networks is a need for operation in the absence of an external magnetic field. If an external magnetic field is used to stabilize magnetization, even a basic circuit element as spin-wave turn exhibits a large dispersion mismatch for regions before and after the turn. Local control of the effective field would stabilize the magnetization of different parts of the magnonic circuit in the desired direction, thus preventing the dispersion mismatch. The required control can be achieved by manipulating the magnetic anisotropy at the local level with nanometer precision. In this talk, I will present our recent work on material systems allowing nanoscale spatial control of magnetic anisotropy. In particular, I will focus on spin-wave turns with dispersion precisely matched along the whole propagation trajectory.



Spin wave propagation in a waveguide with magnetic anisotropy artificially imprinted perpendicular to the waveguide's long axis (top) compared to a conventional waveguide (bottom).