Spin waves on the skyrmion background in thin cylindrical dots

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We calculate high-frequency (10 GHz range) spin wave excitations of the skyrmion ground state thin cylindrical magnetic dots. The skyrmion ground state is represented as combination of two radially symmetric bubble domains. To consider the skyrmion dynamics we apply an approximation of ultrathin domain wall between the circular domains and assume that the magnetic dot is thin enough (magnetization does not depend on the thickness coordinate). The eigenfunctions/eigenfrequencies of spin wave excitations over the skyrmion background are calculated as a function of the skyrmion radius and classified according to number of nodes of the dynamical magnetization in the radial (n) and azimuthal (m) directions (1). Recent experiments on magnetic skyrmion dynamics in patterned nanostructures are discussed.

References:

[1] Z.V. Gareeva, K.Y. Guslienko, phys. stat. sol. – Rapid Res. Lett. 10, 227 (2016).