# Propagating two-dimensional magnetic droplets

**M. Sommacal**
Department of Mathematics, North Carolina State University
Raleigh, USA
matteo.sommacal@gmail.com

Propagating, solitary magnetic wave solutions of the Landau-Lifshitz equation with uniaxial anisotropy in (2+1) dimensions are investigated. These localized, nontopological wave structures extend the stationary, coherently precessing "magnon droplet" to the moving frame. A nonlinear dispersion relation relating the droplet propagation speed to its precessional frequency is derived, yielding a limited range of allowable droplet speeds and frequencies. The analytical structure of the droplet in the far field, slow propagation, and weakly nonlinear regimes is determined using asymptotic methods. An iterative numerical technique is used to compute the propagating droplet's phase, amplitude, and energy-momentum relation. Time-dependent numerical simulations confirm the propagating droplet's stability when its frequency and speed lie within the allowable range.

## References

[1] M. Hoefer and M. Sommacal, "Propagating two-dimensional magnetic droplets", *in preparation.*