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**Magnonic band gaps in films with periodically modified surfaces**[1]
RODRIGO ARIAS, CLAUDIO JARUFE, Universidad de Chile — It is of current interest to understand the electromagnetic response of different nano-structures. In this study we focus on the role of geometry in ferromagnetic modes and response. Specifically we consider a ferromagnetic thin film with periodically perturbed surfaces, in the magnetostatic limit. We focus on the changing behavior of surface modes of the unperturbed film. Our film shows a behavior of interest since magnons propagate in it with band gaps associated to the geometry, i.e. they may be controlled by design. A reduced Brillouin zone scheme is introduced to describe the modes, which are of the Bloch type. Different bands are identified, and they are calculated numerically. For small geometric perturbations we develop a perturbation theory that agrees with our numerical results, and we obtain analytic expressions for the band gaps at the edges of the Brillouin zone. The underlying theory used to calculate the modes was previously developed, and relies on solving integral equations along the edges of the sample for the magnetostatic potential. We also calculate the response to magnetic field waves of a given wavevector that travel along the modulation direction, finding effective line width increments at the edge of the Brillouin zone, where the bands strongly couple.

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