Abstract Submitted
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Surface roughness effects on the magnetostatic modes of cylindrical nanowires RODRIGO ARIAS, Universidad de Chile — A new formulation of the method [1] for finding the magnetostatic modes of ferromagnetic nanowires by use of the extinction theorem is presented. Integral equations along the periphery of the sample resulting from the latter method [1] allow in principle to find the spectrum and the form of the magnetostatic modes propagating along the principal axis (the magnetization is parallel to it) of a cylindrical nanowire of uniform and arbitrary cross sectional shape, without resort to a basis set. The new formulation is technically better since it is independent of the evaluation of the infinite medium Green's functions (upon which the method relies) at arbitrary points inside or outside the sample. This new approach allowed to develop a perturbation theory in order to find the magnetostatic eigenfrequencies and eigenmodes of cylinders whose cross sections differ slightly from an elliptical shape. These results are then used to study the effect of surface roughness on the long wavelength, lowest lying surface modes of a cylinder of elliptical cross section. Numerically one can also determine the eigenfrequencies and shape of the eigenmodes of cylinders whose cross sections are not so close to elliptical. [1] "Magnetostatic modes in ferromagnetic nanowires", Rodrigo Arias and D.L. Mills, Phys. Rev. B, Vol. 70 (9), 094414 (2004).

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