Shape sensitivity analysis for electromagnetic cavities

Pier Domenico Lamberti[1] and Michele Zaccaron[1]

[1]Università degli Studi di Padova

April 27, 2020

Abstract

We study the dependence of the eigenvalues of time-harmonic Maxwell's equations in a cavity upon variation of its shape. The analysis concerns all eigenvalues both simple and multiple. We provide analyticity results for the dependence of the elementary symmetric functions of the eigenvalues splitting a multiple eigenvalue, as well as a Rellich-Nagy-type result describing the corresponding bifurcation phenomenon. We also address an isoperimetric problem and characterize the critical cavities for the symmetric functions of the eigenvalues subject to isovolumetric or isoperimetric domain perturbations and prove that balls are critical. We include known formulas for the eigenpairs in a ball and calculate the first one.

Hosted file $Preprint_{L}am_{Z}ac_{2}0_{0}4_{2}3.pdf available at https://authorea.com/users/315230/articles/445593-shape-sensitivity-analysis-for-electromagnetic-cavities$