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Spectral stability of Maxwell's equations on varying cavities

Abstract: We consider the spectral problem for stationary Maxwell's equations subject to homogeneous boundary conditions on a cavity and we study the dependence of the eigenvalues upon perturbation of the shape of the cavity. We reduce the problem to the spectral analysis of the curlcurl operator and we present two types of results. First, we consider families of diffeomorphic domains and we discuss the analytic dependence of the eigenvalues. In particular, we prove Hirakawa's formula for the shape derivatives and we deduce a Rellich-Pohozaev-type identity. Moreover, we address a related shape optimization problem. Second, we consider families of domains subject to boundary perturbations of oscillatory type and we prove spectral stability results under minimal assumptions on the strength of those oscillations. In particular, we point out the role of suitable uniform Gaffney inequalities which are proved for our purposes. Based on joint works with Michele Zaccaron.