Calculation, normalization and perturbation of quasinormal modes in coupled cavity-waveguide systems

We show how one can use a non-local boundary condition, which is compatible with standard frequency domain methods, for numerical calculation of quasinormal modes in optical cavities coupled to waveguides. In addition, we extend the definition of the quasinormal mode norm by use of the theory of divergent series to provide a framework for modeling of optical phenomena in such coupled cavity-waveguide systems. As an example, we apply the framework to study perturbative changes in the resonance frequency and Q value of a photonic crystal cavity coupled to a defect waveguide.
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