On the computation of resonances in absorptive photonic crystals with the interior penalty method

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Photonic crystals are promising materials for controlling and manipulating electromagnetic waves [1]. The spectral parameter is usually related to the time frequency and the Floquet-Bloch wave vector is a parameter. This leads to a rational spectral problem when the frequency dependence of a Lorentz material model is included [2,3]. A different approach is based on a quadratic spectral problem in the amplitude of the Floquet-Bloch wave vector [4].

We use a high-order interior penalty method with curved elements to discretize the quadratic and the rational eigenvalue problem. The resulting matrix problems are transformed into linear eigenvalue problems and approximate eigenpairs are computed with a Krylov space method. The limitations of the used linearization and the connection between the two approaches will be discussed.

References:

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