Sensitivity analysis for Maxwell eigenvalue problems in industrial applications

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In this presentation we focus on the sensitivity analysis of Maxwell's eigenvalue problem, where the derivatives of the eigenvalues are calculated with respect to design parameters (i.e., material or geometrical parameters). Utilizing the adjoint approach the derivatives can be calculated at almost no additional cost. The challenge consists in the computation of the required derivatives (i.e., derivatives of bilinear forms with respect to the design parameters) from a higher order, curved finite element discretization. Numerical studies show the application for a real life electromagnetic filter application where the sensitivities of the eigenvalues give a better insight into the characteristics of the underlying filter. The benefit is apparent if the adjoint method is compared to a standard finite difference approach.

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