Type: Minisymposium Contribution

## Eigenvalue optimization with respect to shape-variation in electromagnetic cavities

Thursday, August 15, 2024 9:30 AM (30 minutes)

In this talk, we consider a freeform optimization problem of eigenvalues in a particle accelerator cavity by means of shape-variations with respect to small deformations. As constraint we utilize the mixed variational formulation by Kikuchi of the normalized Maxwell's time-harmonic eigenvalue problem. For the eigenvalue optimization, we apply the method of mappings. We show results of continuity and differentiability of the eigenvalues and the associated eigenfunctions. Further, we derive an optimility system and the reduced cost functional by using the adjoint calculus. In addition, to solve the considered optimization problem, we present a damped inverse BFGS method. We conclude with a numerical example, which shows the functionality of the optimization method, and with an outlook where we explain ongoing work and further ideas to extend the usability of this mathematical approach to real-life problems.

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