Eigenvalue problems arising from coupled partial differential equations

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Determining the response of materials to a given phenomenon is crucial to our description of the world. In particular, recently discovered complex materials with unique features and usually specific microstructure are key to much technology. The corresponding fundamental mathematical problems are eigenvalue problems arising from coupled partial differential equations. In this talk, we discuss spectral properties of operators associated with the corresponding least-squares finite-element minimization of the residual. The convergence of the discrete eigenvalues and eigenfunctions towards the corresponding continuous eigenmodes is studied and analyzed with the help of appropriate L2 error estimates. A priori and a posteriori estimates are proved.

References:

[1] Bertrand, Fleurianne, and Daniele Boffi. "First order least-squares formulations for eigenvalue problems." IMA Journal of Numerical Analysis 42.2 (2022): 1339-1363.

[2] Bertrand, Fleurianne, and Daniele Boffi. "Least-squares formulations for eigenvalue problems associated with linear elasticity." Computers & Mathematics with Applications 95 (2021): 19-27.

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