On an unsymmetric eigenvalue problem governing free vibrations of fluid-solid structures

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In this talk we discuss properties and adapted solvers for the unsymmetric eigenproblem

$$\begin{pmatrix} K_s & C \\ 0 & K_f \end{pmatrix} \begin{pmatrix} x_s \\ x_f \end{pmatrix} = \lambda \begin{pmatrix} M_s & 0 \\ -C^T & M_f \end{pmatrix} \begin{pmatrix} x_s \\ x_f \end{pmatrix} \tag{1}$$

which governs free vibrations of fluid-solid structures. Here, K_s and K_f are stiffness matrices, M_s and M_f are mass matrices and C describes the coupling between fluid and solid.

We introduce a Rayleigh functional p for this eigenproblem which has similar properties as the Rayleigh quotient of a Hermitian matrix. This Rayleigh functional is used to derive an iterative projection method of Jacobi-Davidson type to solve problem (1).

This is joint work with Heinrich Voss.

References

M. Stammberger, H. Voss. Report 128, Institute of Numerical Simulation, Hamburg University of Technology, 2009. On an unsymmetric eigenvalue problem governing free vibrations of fluid-solid structures. Submitted to ETNA.