

On the conditioning and convergence estimates of the real plane wave basis: a simple study case

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Abstract

In the last decade, new volume discretization methods using superpositions of real (propagative) plane waves have been devised for the numerical solution of time-harmonic acoustic and elastic problems [1, 2, 3, 4, 5]. Using functional analysis arguments, conditioning and convergence estimates are addressed in [2, 3]. In this talk, a different approach is proposed. Focusing on the Dirichlet problem in the unit disk, precise estimates for the error (in the maximum-norm) as well as the conditioning number arising from both least-square and collocation formulations are given. This example illustrates in a simple manner the influence of the frequency and the number of plane waves. Numerical calculations confirm the theoretical results. The idea is also applied for the elastodynamic problem.

References

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