# Isogeometric approximation of acoustic wave problems: spectral properties and Overlapping Schwarz preconditioners

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In recent years, Isogeometric Analysis (IGA) discretizations of PDEs have been applied also to wave propagation problems [1]. In our previous works, we have studied the stability and convergence properties of IGA Galerkin and Collocation approximations of the acoustic wave equation with first order absorbing boundary conditions, using Newmark's schemes in time. Since both the IGA Galerkin and Collocation mass matrices are not diagonal, the solution of the linear system at each time step is a key issue for both explicit and implicit Newmark schemes. Given the lack of theoretical estimates concerning eigenvalues and conditioning of the IGA mass and stiffness matrices for wave problems, an extensive numerical investigation of the spectral properties of the NURBS-based IGA matrices has been performed in [2]. This work considered the behavior of the eigenvalues and condition numbers of the mass and stiffness IGA matrices for acoustic wave problems, varying the polynomial degree $p$, mesh size $h$, regularity $k$, time step $\Delta t$ and parameter $\beta$ of the Newmark scheme. In this presentation, we illustrate in particular some numerical results on the application of an additive overlapping Schwarz preconditioner to both IGA Galerkin and Collocation approximations [3], testing its performance with preconditioned conjugate gradients or GMRES iterative methods.

## REFERENCES

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