

Multigrid solvers for the biharmonic problem in IgA

Jarle Sogn* and Stefan Takacs†

* Institute of Computational Mathematics
Johannes Kepler University Linz,
Altenberger Str. 69, 4040 Linz, Austria
e-mail: jarle.sogn@gmail.com

† Johann Radon Institute for Computational and Applied Mathematics,
Austrian Academy of Sciences,
Altenberger Str. 69, 4040 Linz, Austria
e-mail: stefan.takacs@ricam.oeaw.ac.at

ABSTRACT

In this presentation, we present multigrid solvers for the biharmonic problem in the framework of isogeometric analysis (IgA). In IgA it is easy to set up H^2 -conforming discretizations and we consider the primal formulation of the biharmonic problem. We will propose two multigrid methods for such a discretization, one based on Gauss-Seidel smoothing and one based on mass smoothing. We will prove that both are robust in the grid size, the latter is also robust in the spline degree. Numerical experiments illustrate the convergence theory and indicate the efficiency of the Gauss-Seidel based multigrid approach, particularly in cases with non-trivial geometries. Finally, we present a hybrid smoother, which combines the two smoothers.