Solving the triharmonic equation over planar multi-patch domains using isogeometric analysis

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ABSTRACT

The triharmonic equation, a sixth order partial differential equation, is solved over bilinearly parameterized planar multi-patch domains by means of isogeometric analysis. This requires the use of a space of globally C^2-smooth isogeometric functions as discretization space for the sixth order partial differential equation.

We present the construction of a C^2-smooth isogeometric spline space which consists of three different types of functions called patch, edge and vertex functions corresponding to the single patches, edges and vertices of the multi-patch domain. The construction of the functions is simple, and is based on solving small systems of linear equations and/or on using simple explicit formulas. In addition, all functions possess a small local support, and are well-conditioned. Several numerical examples demonstrate the potential of the constructed C^2-smooth isogeometric spline space for solving the triharmonic equation.