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SPECTRAL ANALYSIS OF MATRICES FROM NURBS ISOGEOMETRIC METHODS

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When discretizing a linear PDE by a linear numerical method, the computation of the numerical solution reduces to solving a linear system. The size of this system grows when we refine the discretization mesh. We are then in the presence of a sequence of linear systems with increasing size. It is usually observed in practice that the corresponding sequence of discretization matrices enjoys an asymptotic spectral distribution. Roughly speaking this means that there exists a function, say f, such that the eigenvalues of the considered sequence of matrices behave like a sampling of f over an equispaced grid on the domain of f.

In this talk we analyze the spectral properties of discretization matrices arising from isogeometric Galerkin and collocation methods, based on d-variate NURBS of given degrees and applied to general second-order elliptic partial differential equations defined on a d-dimensional domain [1, 3].

The provided spectral information can be exploited for designing algorithms with convergence speed independent of the fineness parameters and also substantially independent of the degrees of the used NURBS [2].

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