

Well conditioned frames for high order finite element methods

Kaibo Hu and Ragnar Winther

We discuss representations of high order C^0 finite element spaces on simplicial meshes in any dimension. When computing with high order piecewise polynomials the conditioning of the basis is likely to be important. The main result of this work is a construction of representations by frames such that the associated L^2 condition number is bounded independently of the polynomial degree. To our knowledge, such a representation has not been presented earlier. The main tools we will use for the construction is the bubble transform [1], and properties of Jacobi polynomials on simplexes in higher dimensions.

References

- [1] Richard S. Falk and Ragnar Winther. “The bubble transform: A new tool for analysis of finite element methods.” *Foundations of Computational Mathematics* 16.1 (2016): 297-328.