

# Surviving without the Shape Functions

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The use of 0-Cochains in the approximation of boundary value problems allows the use of elements (in 2 and in 3 dimensions) of very general shape, leaving the patch-test intact and hence, somehow, ensuring first order convergence. In the construction of the corresponding stiffness matrix the procedure allows a certain amount of freedom. The best use of this freedom is still under question. The lecture will present the result of a recent paper (joint work with A. Buffa and K. Lipnikov) and discuss the use of 0-Cochains in the general frameworks of cochain approximation and of Mimetic Finite Differences. A useful survey of “what is known and what is not known, what has been proved, and what has been conjectured” will also be presented.