1067-35-173 **Andrew K. Gillette*** (agillette@math.utexas.edu), Department of Mathematics, 1 University Station C1200, Austin, TX 78712, and **Chandrajit Bajaj**. *Dual Interpolants for Finite Element Methods.*

A canonical methodology for the discretization of differential operators is provided by the theory of Discrete Exterior Calculus (DEC). While this approach recreates many well known finite element systems associated to objects in a simplicial mesh of the domain, it also suggests novel linear systems associated to objects from an orthogonal dual domain mesh. In particular, it highlights the need for vector interpolant functions defined over polygonal and polyhedral elements which conform to the deRham complex associated to the problem.

In this talk, we will introduce the basics of the DEC technique and demonstrate how a dual-based system can easily be derived from a combined DEC-deRham diagram. Additionally, we will present a procedure for the design of dual-based scalar and vector interpolants with an eye toward their use in creating a discrete Hodge star (a.k.a. "mass matrix") used to transfer data between the primal and dual domain meshes. We will conclude with some initial results on the robustness of finite element solutions computed by this approach. (Received July 28, 2010)