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Ari Stern* (astern@math.wustl.edu) and **Paul C. Leopardi**. *The abstract Hodge–Dirac operator and its stable discretization.*

Most of the recent work on finite element exterior calculus has focused on the second-order Laplace operator and its variants, including the Laplace–Beltrami operator on a Riemannian manifold, the Hodge–Laplace operator for differential forms, and—most general of all—the abstract Hodge–Laplace operator on a Hilbert complex. By comparison, Dirac operators have received relatively little attention from the perspective of numerical PDEs, despite the fact that these first-order operators are, in many ways, just as fundamental as the Laplace operators mentioned above.

In this talk, we introduce an abstract Hodge–Dirac operator and analyze its discretization by mixed finite elements. This is shown to have a deep connection with discrete Hodge theory, and in fact, many of the theorems on the Hodge–Laplace operator in finite element exterior calculus are shown to be corollaries of these new results. (Received September 24, 2012)