TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Wednesday, 7 Novermber 2016, 1:30 p.m. (special time)
Room 617 Wachman Hall

(refreshments and social at 2:30 p.m, after the talk)

A Mixed Finite Element Method for Regularizing the Optical Flow Constraint

by Rich Lehoucq
Sandia Nationa Laboratories

Abstract. My presentation introduces a mixed finite element method for the estimation of the velocity in the optical flow constraint, i.e., an advection equation. The estimation problem is well-known to be undetermined because the velocity vector cannot be recovered from the scalar field advected unless further restrictions on the flow, or motion, are imposed. If we suppose that the velocity is solenoidal, a well-defined least squares problem with a minimizing velocity results. Equivalently, we have imposed the constraint that the underlying motion is isochoric. We then demonstrate that the resulting least squares system is ill-posed and regularize via a mixed formulation of the Poisson equation. Standard results for the Poisson equation demonstrate that the regularized system is well-posed and has a stable finite element approximation. A numerical example demonstrating the procedure is given. This is joint work with Dan Turner, Sandia National Labs.