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SEMINAR

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April 7, 2005
304 Whitehead Hall
Refreshments: 3:30 p.m.
Seminar: 4:00 p.m.

NON-OSCILLATORY SPLINES AND LINEAR PROGRAMMING

ABSTRACT

Three-dimensional scanning instruments, called LADARs, are being used in many areas from defense to construction to art reconstruction and forensics. They typically generate millions of unstructured sets of points, called “point clouds”. The military and construction industry, in particular, are interested in using the data to model urban environments. A problem arises when interpolation polynomials are used to model the scanned data at or along sharp edges of buildings. If traditional least squares fitting is used, there arise oscillations, called the Gibbs phenomenon, along the sharp edges. This talk will describe numerical experiments, using two variational principles and interpolative finite elements, that show promise in modeling structures with sharp edges. One of the approaches leads to a linear-programming formulation for minimizing the variational principle. The other uses a relaxation algorithm in the Gauss–Seidel spirit. The talk will address some of the questions and convergence problems that arise with both algorithms. The problems addressed are ripe research areas.

(This is joint work with Marjorie McClain and Christoph Witzgall.)