Multivariate Refinable Hermite Interpolants
and
Spectral Radius Optimization

Thomas P.-Y. Yu
Rensselaer Polytechnic Institute

joint work with

Bin Han, University of Alberta
and
Adrian Lewis, University of Waterloo
and
Michael Overton, New York Univeristy

Subdivision schemes are iterative methods for producing smooth objects with a built-in multi-resolution structure. They are fundamental in the business of wavelet constrcution and in free-form surfaces in computer-aided geometric design. We propose and analyze a class of multivariate subdivision schemes with a special Hermite interpolatory property; as well as a computational algorithm for their constructions.

Underlying this construction algorithm is a non-smooth non-convex spectral radius optimization problem. We propose to solve it using a recently developed gradient-bundle method (originally designed for solving the spectral abscissa minimization problem in control theory.)

If time is going to allow, I will discuss two other interesting outcomes of this project. (1) In two families of small support schemes, we found that our construction method recovers two classical spline-interpolation schemes (Powell-Sabin and Sibson.) (2) We provide an algorithm for applying our subdivision based interpolants to build free-form subdivision surfaces.