PIMS / AMI Seminar

Friday, October 28, 2016
3:00 p.m.
CAB 657

"Radial Basis Functions: Interpolation, Convergence, and Multiquadrics with Parameters"

Martin Buhmann
Justus-Liebig University

Abstract

In this talk we will describe a modern method of functional approximation in many variables and to scattered data in high dimensional ambient spaces.

Radial basis function methods are a useful approach especially to multivariable approximation, e.g., by interpolation, but also using the successful alternative called quasi interpolation. This is all based on the idea that one can employ shifts of a single radially symmetric function to form spaces of approximating functions in any number of variables. This univariate function can be a decaying function such as an exponential, but unbounded radial basis functions such as multiquadrics are successful too. The radial symmetry of the basis functions nicely combines desired multivariable approximations with an analysis that is in many aspects based in fact on univariate analysis.

The initial approach to choosing which approximants to take, given possibly a very large number of scattered data in high dimensions, is usually by interpolation. Therefore one uses shifts of a radial basis function, such as the multiquadrics or Gauss- or Poisson-kernel, all of which are related to solving certain partial differential equations and to minimizing some particular semi norms, to interpolate the mentioned data. This of course raises the question of solvability of the problem and of the efficient computability. Standard approaches such as multivariable splines do not necessarily have this problem, but are unfortunately most difficult to use in really high dimensional spaces.

We will discuss in this talk mainly multiquadric interpolation, its convergence properties when centres become dense in multiple dimensions, and their behaviour when parameters of the multiquadric function change.

Refreshments will be served in CAB 649 at 2:30 p.m.