ESI Erwin Schrödinger International Institute for Mathematics and Physics

universität wien

DVR 0065528

Seminar

Dr. Kerstin Hesse

U Paderborn

Radial basis function approximation of noisy scattered data on the sphere

Tuesday, September 19, 2017

at 14:00 h

ESI, Boltzmann Lecture Hall

Abstract: In geophysical applications, measured scattered data usually contains noise, and any approximation method should take this into account. In this talk we discuss the properties of a 'smoothing approximation' of noisy scattered data on the sphere by a radial basis function approximant. The radial basis function approximant is the minimiser of a certain quadratic functional which depends on a smoothing parameter $\lambda > 0$ that balances between fitting the data and getting a smooth solution. For $\lambda \to 0$, we obtain the interpolation scenario. The procedure is an instance of penalised least-squares approximation and of Tikhonov regularisation. The radial basis function approximant is computed by solving a linear system with a positive definite matrix.

A crucial question is how the smoothing parameter λ should be chosen depending on the noise level, and in this talk we consider one a posteriori strategy for choosing λ, namely Morozov's discrepancy principle. For λ chosen with Morozov's discrepancy principle, we present order-optimal L_2-error estimates in terms of powers of the mesh norm and the noise level. A numerical test illustrates the theoretical work.

This talk is about recent and ongoing joint work with Ian Sloan and Rob Womersley.

A. Hinrichs, F. Pillichshammer

September 14, 2017