Mathematisches Kolloquium

Am Freitag, den 23. November 2012 spricht um 14 Uhr c.t. im Hörsaal IV der Fachrichtung Mathematik (Gebäude E2 4)

Dr. Andreas Kleefeld
Brandenburgische Technische Universität Cottbus

über das Thema:

Direct and Inverse Acoustic and Electromagnetic Scattering in Three Dimensions

Abstract: In the first part of this talk, the acoustic scattering for sound-soft obstacles is explained. The direct acoustic scattering problem consists of finding the scattering amplitude for a given incident wave and obstacle in three dimensions. The problem at hand is solved with a Fredholm integral equation of the second kind. Its approximate solution is found with the boundary element collocation method. Highly accurate results are obtained due to superconvergence. The more complicated nonlinear and ill-posed inverse problem consists of reconstructing the surface of the obstacle given the incident wave and the scattering amplitude. This problem is solved with the nonlinear Landweber method. Numerical examples are illustrated to show that obstacles can be reconstructed with this method. In addition, we briefly review other acoustic scattering problems and report numerical results.

In the second part of this talk, the exterior Maxwell boundary-value problem in three dimensions is reviewed. The problem at hand is solved again with a Fredholm integral equation of the second kind and its approximate solution is found with the boundary element collocation method. Superconvergence at the collocation nodes is proven, where the cases of even and odd interpolation are distinguished. Finally, the performance of the method is demonstrated with numerical results confirming the superconvergence.

Key words. Fredholm integral equation, Helmholtz & Maxwell equation, boundary element collocation method, superconvergence, regularization

AMS subject classifications. 35J05, 35Q60, 45B05, 65F22, 65N35, 65N38

Der Gast wird von Prof. Burgeth betreut.

Alle Interessenten sind zum Vortrag herzlich eingeladen.

Kaffee ab 13.45 Uhr im Konferenzraum der Mathematik   (EG - 1.03)

Die Dozenten der Mathematik