Oberseminar Geomathematik/
Kolloquium des Departments Mathematik

Im Rahmen des Oberseminars der AG Geomathematik und des Kolloquiums des Departments Mathematik findet der folgende Gastvortrag statt, zu dem hiermit alle Interessierten recht herzlich eingeladen sind. Der Vortrag wird von

Prof. Dr. Willi Freeden (TU Kaiserslautern)

am

Donnerstag, den 26. Juni 2014 um 16:15 Uhr

im Raum ENC-D 120

gehalten zum Thema

„Lattice Point Summation and
Shannon Sampling in Euclidean Spaces".

Prof. Dr. V. Michel

Lattice Point Summation
and
Shannon Sampling
in
Euclidean Spaces

Prof. Dr. Willi Freeden, TU Kaiserslautern,
Geomathematics Group

Abstract.

The famous Shannon sampling theorem gives an answer to the question how a time signal bandlimited to a subinterval $\mathcal{G}$ of the fundamental cell $\mathcal{F}$ of the lattice $\mathbb{Z}$ can be reconstructed from discrete values in the lattice points of $\mathbb{Z}$. In this lecture, we are concerned with the problem how a space signal bandlimited to a (geoscientifically relevant) region $\mathcal{G} \subset \mathbb{R}^q$, $q \geq 2$, allows a reconstruction from discrete values in the lattice points of a (general) lattice $\Lambda \subset \mathbb{R}^q$.

The sampling procedures obtained here are based on new techniques of lattice point summation. An essential tool is the extension of the Euler summation formula to certain second order Helmholtz–type operators in Euclidean spaces $\mathbb{R}^q$ involving the associated Green functions with respect to the "boundary condition" of periodicity. In order circumvent convergence difficulties and/or slow convergence in multi–dimensional lattice point summation, summability methods are discussed in more detail, namely lattice ball and Gauß–Weierstraß averaging. In consequence, multi–dimensional lattice sampling becomes available in the specified summability context.

The work was initiated by Zuhair M. Nashed, University of Central Florida, Orlando. Its content is based on the monograph "W. Freeden (2011): Metaharmonic Lattice Point Theory, CRC Press, Taylor & Francis Group, Boca Raton."