Einladung zur öffentlichen Defensio von

Dipl.-Math. Nicki Holighaus

Thema der Dissertation:

Theory and implementation of adaptive time-frequency transforms

Abstract: This thesis has the goal of presenting and extending modern methods of applied, mathematical time-frequency analysis. To this end, we investigate two different types of flexible time-frequency representations, namely nonseparable and nonstationary Gabor transforms, their properties and implementation. Our approach builds on the underlying concepts of frames to construct stable and invertible systems of time-frequency atoms. The treatment of discrete Gabor transforms on arbitrary, nonseparable lattices starts from an elegant, unique representation of lattices by means of 3 intuitively meaningful parameters. From this representation, we can easily determine the number of all possible lattices, or those of a particular cardinality, for a given signal length. Furthermore, it allows the straightforward description of any lattice as through simple rectangular lattices, enabling efficient implementation. We develop a theory of nonstationary Gabor transforms, admitting the variation of both the window function and the sampling density along either the time or the frequency axis. We investigate the structure of this type of system and their associated frame operators, e.g. sufficient and necessary frame conditions. We discuss exemplary implementations of time- or frequency-adaptive systems and efficient reconstruction.

Prüfungssenat:

Univ.-Prof. Dr. Josef Hofbauer (Vorsitz)
(Universität Wien)

ao. Univ.-Prof. Dr. Hans Georg Feichtinger
(Universität Wien)

Prof. Dr. Ole Christensen
(Technical University of Denmark)

Prof. Dr. Karlheinz Gröchenig
(Universität Wien)

Zeit: Freitag, 04. Oktober 2013, 11:00 Uhr

Ort: Fakultät für Mathematik, Seminarraum 10, Oskar-Morgenstern-Platz 1