

Modelling and Simulation of Physical Systems with Multidimensional Transfer Functions

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Abstract

The transfer function approach to modelling and simulation of physical systems can be summarized by a few steps: The most common mathematical description of multidimensional physical systems are partial differential equations. The spectral decomposition of their differential operators leads to an alternate system representation in the form of multidimensional transfer functions. For computer implementation a discrete-variable representation is required which can be obtained by suitable continuous-to discrete transformations. Finally signal processing algorithms lead to efficient realizations including real-time implementations.

This talk describes these steps in more detail, reviews some recent applications in audio and acoustics and gives an outlook to new problems.

About the Speaker:

Rudolf Rabenstein studied Electrical Engineering at the University of Erlangen-Nuremberg, Germany, and at the University of Colorado at Boulder, USA. He received the degrees "Diplom-Ingenieur" and "Doktor-Ingenieur" in electrical engineering and the degree "Habilitation" in signal processing, all from the University of Erlangen-Nuremberg, Germany in 1981, 1991, and 1996, respectively. He worked with the Physics Department of the University of Siegen, Germany, and now as a Professor with the Telecommunications Laboratory at the University of Erlangen-Nuremberg. His research interests are in the fields of multidimensional systems theory and multimedia signal processing. Previous service includes a membership of the Technical Committee for Signal Processing Education of the IEEE Signal Processing society and several editorial tasks for IEEE publications. Currently he is an associate editor of the Springer journal Multidimensional Systems and Signal Processing.

