



# Einladung zum Oberseminar Wissenschaftliches Rechnen

Julius-Maximilians-Universität Würzburg  
Lehrstuhl für Wissenschaftliches Rechnen IX

*Dr. Hans-Georg Zimmermann*

*Senior Principal Research Scientist*

Siemens AG, Corporate Technology, München

## Recurrent Neural Networks in System Identification, Forecasting and Control

As a first concept we will introduce a correspondence principle between equations, architectures and local algorithms. The talk follows this principle. The parameter identification (learning) of the networks will be touched but not be explained in detail.

Recurrent neural networks will be introduced as state space models and extended to error correction neural networks on manifolds. These concepts work well for up to 10-dimensional state spaces. The next major step is the extension to large dynamical systems. There is no homotopy from small to large systems - we need new concepts which have no counterpart in the domain of small systems. Especially for human controlled dynamical systems (e.g. markets) we will introduce causal-retro-causal dynamical systems. This part will end up with a new view on uncertainty in forecasting.

Optimal control theory is a well developed theory under the assumption that the dynamical equations are known. Neural networks base on the assumption that these equations are not known a priori. Finally we will merge neural state space models and optimal control.

Ort: Raum 30.02.003 (2. Stock) (Mathegeb. 30 West) Zeit: Montag, 19.11.2012, um 14.00 Uhr

Zu diesem Vortrag laden wir Sie herzlich ein.

*gez. Prof. Dr. Alfio Borzi*

*gez. Prof. Dr. Bastian von Harrach*