



freiburger zentrum für datenanalyse
und modellbildung

Einladung

Im Seminar *Datenanalyse und Modellbildung* findet am

Freitag, den 3. November 2017, ab 13:30 Uhr

in der Eckerstr.1, Raum 404, 4.OG ein Sonderkolloquium und eine

Feier zum 30-jährigen Bestehen des FDM-Seminars

statt.

13:30 Einführung mit Beiträgen von Prorektor Prof. Dr. Gunther Neuhaus und dem Mit-Gründer des FDM, Prof. Dr. Josef Honerkamp

14:00 Prof. Dr. Leonhard Held (University of Zurich): Building a Statistical Model: The Endemic-Epidemic Modelling Framework

15:00 Kaffee

15:30 Prof. Dr. Rainer Dahlhaus (Heidelberg University): Cointegration and Phase Synchronization: Bridging Two Theories

16:30 Prof. Dr. Josef Teichmann (ETH Zürich): Affine processes in mathematical Finance

17:30 Schluss

Siehe auch: <https://www.fdm.uni-freiburg.de/seminar/feier>

Gäste sind herzlich willkommen!

Abstracts

Prof. Dr. Leonhard Held (University of Zurich)

Title: Building a Statistical Model: The Endemic-Epidemic Modelling Framework

Novel statistical methods arise as a result of contact with data combined with concrete research questions. Statistical modelling has been described as the art to find a suitable mathematical framework based on probability distributions that allows the questions at hand to be answered or new ones to be posed (Davison, 2003, *Statistical Models*, Cambridge University Press). To this end, it is often necessary to find a pragmatic balance between parsimony and complexity.

In this talk I will review the development of the endemic-epidemic modeling framework for multivariate time series of infectious disease counts (Held et al, *Stat Med*, 36, 3443-3460, 2017 and references therein). The formulation is built upon an additive decomposition of disease incidence into an endemic and an epidemic component. The endemic component may represent seasonal and climatic variation, heterogeneity in population numbers and other socio-demographic characteristics. The epidemic component describes the force of previously infected individuals through spatio-temporal or social interaction. I will discuss how research questions from epidemiology and public health have been coupled with mathematical theory, statistical methodology and the available surveillance data to study and to predict the spread of infectious diseases.

Prof. Dr. Rainer Dahlhaus (Heidelberg University)

Title: Cointegration and Phase Synchronization: Bridging Two Theories

In this talk we present with VEC-state oscillators a new multivariate time series model for oscillators with random phases. In particular the phases may be synchronized. The model is a nonlinear state space model where the phase processes follow a vector error correction model used in econometrics to model cointegration. We demonstrate the relevance of this model for phase synchronization. In that way we bridge the theories of cointegration and phase synchronization which have been important theories in econometrics and physics, respectively. The common ground of both theories is that they describe the fluctuation of some multivariate random process around an equilibrium. We demonstrate how the methods from cointegration can be applied to phase synchronization. In particular we consider an unidirectionally coupled Rössler-Lorenz system and identify the unidirectional coupling, the phase synchronization equilibrium and the phase shifts with cointegration tests.

Prof. Dr. Josef Teichmann (ETH Zürich)

Title: Affine processes in mathematical Finance

Affine processes are an almost universal modelling tool in mathematical Finance. We show some interesting historic aspects of the theory of affine processes and several recent developments.