

**Registration for
2nd Annual Workshop on Bio-Automation
19-20 Nov 2015, Großkarlbach / Palatine**

Conference Fee: both days none, else

- 60.00 EUR for 19 Nov 2015 only (plus board)**
- 30.00 EUR for 20 Nov 2015 only (plus board)**

Costs of Accommodation and Board

- 142.00 EUR for 18 / 19 / 20 Nov 2015**
- 89.00 EUR for 19 / 20 Nov 2015**

**Include: Single-room w/ buffet breakfast;
half-board (lunch on 19 Nov 2015 and refresh-
ments in session breaks on both days)
Exclude: Dinners, beverages at lunches**

- 15.00 EUR for a lunch on 20 November 2015**

**Payment is to be made directly to the Hotel
Winzergarten on site.**

Yes, I wish to take part and I do register
 for the Workshop 19-20 November 2015
 and also need accommodation on 18 Nov

Name _____

Institution _____

Address _____

Phone / Fax _____

E-Mail _____

Signature: _____

**Fax to: 02151-5129676 or
E-Mail: biokyb@t-online.de**

Scope

Biokybernetik (engl. bio-automation) combines bio-systems modeling, molecular bio-data methodologies and clinical characterizations for a holistic understanding of human body's functional and a person's operational management and control systems from an engineering perspective.

2nd Annual Workshop “Arbeitstreffen” on Bio-Automation “Methods of Modeling - A Review” is expected to shed light on techniques of modeling, specifically: flows of energy (mass, information) in the body system; *in silico* investigation of effects of interventions in complex dynamic systems; chemical process engineering of bioreactors; urban health systems.

Target Participants

Systems scientists in mathematics, engineering, biology, psychology, medicine, public health, ecology, economics, sociology; max 30 persons.

Contributed Papers

Topics within scope or related to invited talks are welcome; title and abstract must be submitted before **11 November 2015** with author's registration.

Begin and End

Opening: approx. 09:30 on Thu 19 Nov 2015
Closing: approx. 13:30 on Fri 20 Nov 2015

Venue

Hotel Winzergarten, Hauptstr. 17, 67229
Großkarlbach, www.hotel-winzergarten.de

Organizer

Prof. Dr. J. Mau, Buschstr. 9, 47800 Krefeld,
Phone: 02151-5129675, Fax: 02151-5129676

Initiative Biokybernetik

**1st Announcement &
Call for Papers**

**2nd Annual Workshop
“Arbeitstreffen” on
Bio-Automation**

**“Methods of Modeling -
A Review”**

**19-20 November 2015
Großkarlbach / Palatine**



Convenor

Prof. Dr. J. Mau, Düsseldorf

Program Preview

Introductory Lecture on A Systems Understanding of Health and Diseases in Human Populations

by Professor Dr Jochen Mau, Heinrich Heine University, School of Medicine, Düsseldorf, Germany

Tutorial on Mathematical Modeling of Flow in Human Body System

by Professor Dr Sergey Mukhin, Moscow State University Lomonosov, Computational Mathematics and Cybernetics, Moscow, Russian Federation,

Special Invited Lecture on Agent-based Modeling and Game Theory

by Professor Dr Thomas Pitz, Rhine-Waal University of Applied Sciences, Society and Economics, Kleve, Germany

Special Invited Lecture on Principles of Chemical Process Engineering (tentative)

by N.N., Institute of Thermal Separation Processes, Technical University Hamburg-Harburg, Germany

Special Invited Lecture on Urban Health Systems

by Professor Dr med Alexander Krämer, Department of Public Health Medicine, University of Bielefeld, Germany

Further Invited Speakers

Prof Dr M Mangold, Max Planck Institute of Dynamics of Complex Systems, Magdeburg, Germany (unconfirmed)

Dr-Ing Berno J. E. Misgeld, Helmholtz Institute of Biomedical Technology, RWTH Aachen, Germany

Dr. med. Johannes W. Dietrich, Bergmannsheil University Hospital Bochum, Germany (unconfirmed)

Tutorial Abstract

Mathematical modeling of general hemodynamic and its application for studying liquid and matter flows in human body.

S. Mukhin, M. Abakumov, A. Borzov, A.

Bunicheva, A. Dreval, A.Mozokhina, N. Sosnin

The aim of modeling general hemodynamics in quasi-one-dimensional approximation is to carry out estimation of hydrodynamic blood flow (velocity, pressure, cross-section) along the graph, which is physiologically adequate to human cardiovascular system, and to represent the main characteristics of blood circulation system. A correct description of blood velocity in the vascular network makes possible to simulate the propagation rate of various substances in the whole cardiovascular system or its part and to model the effect of these substances on the hemodynamics as a whole. The report describes what problems were solved during the work on the CVSS (Cardio-Vascular Simulating System) project to achieve specifically:

- cardiovascular system was assigned a graph of blood vessels, and the physiological parameters of vessels were described by equations of state of various vessel types;
- models of organs affecting the work of the blood circulation system (heart, tissues, kidneys, intestine) were developed;
- models of blood flow regulation were suggested;
- a model of substance transport by the blood flow and a conservative algorithm for calculating of mass transfer by blood along the graph was developed;

- models for glucose and insulin production were elaborated;
- a uniform algorithm for the calculation of the flow of viscous incompressible fluid in a system of elastic tubes in the quasi-one-dimensional approximation was developed;
- this algorithm was implemented in an expandable (by including new models and processes) software;
- in a linear approximation an analytical description of the propagation of pressure and velocity pulse waves in an arbitrary graph of the cardiovascular system was proposed;
- a physiologically valid pattern of blood flow in the vascular system was numerically simulated and used as a basic one in future studies;
- the way of modeling of propagation of lymph along the graph of lymphatic vessels was suggested;
- anatomically adequate spatial model of lymphatic net was created. This model is topologically consistent with the cardiovascular system;
- models for coupling of cardio-vascular and lymphatic system based on the convection-diffusion equations were considered;
- numerical experiments for practical and fundamental medicine were performed.