M²SABI’97
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edited by Prof. I. Farkas
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MATHEMATICAL MODELLING
and
SIMULATION
in
AGRICULTURAL and BIO-INDUSTRIES

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Department of Physics and Process Control
Godöllö University of Agricultural Sciences
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GUAS
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"Modelling and Control in Agricultural Processes"
and
"Intelligent Control in Agricultural Automation"
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# Symposium Program

## A: OPENING ADDRESSES

I. Farkas, Symposium Chairman  
R. Hanus, IMACS representative  
L. Keviczky, IFAC Council representative  
Y. Hashimoto, IFAC CC Chairman  
Cs. Székely, Rector, Gödöllő University of Agricultural Sciences, Hungary  
A. Vas, Dean, Faculty of Agricultural Engineering

## B: CROP MODELLING

[Chair: W. Day]

B1 Pathways in crop modelling for cultivation control. *G. van Straten* (NL)

## C: MODELLING OF PLANT RESPONSES AND ITS ENVIRONMENT

[Co-chairs: R.J. Strasser, M.I. Ferreira]

C1 Influence of photosystem II heterogeneity on the simulated CHL A fluorescence induction transients. *Strasser R.J.* (CH), *A.D. Stirbet* (CH)


C3 Experimental study of a stress coefficient: application on a simple model for irrigation scheduling and daily evapotranspiration estimation. *Ferreira M. I.* (P), *C. Valancogne* (F)

C4 Modeling of bean plant nutrition from hydroponic culture I. potassium, phosphorurus, calcium, magnezium, manganese and zink uptake. *Biró A.* (H), *F. Kőrosi* (H), *I. Farkas* (H), *P. László* (H)

C5 Deposition of ammonia over an *Eucalyptus globulus* sp. forest during winter: preliminary results. *Bispo R.* (P), *A. Garcez* (P), *F. Abreu* (P)


## D: EXPERIMENTAL STRATEGIES FOR BIOPROCESS AND PRODUCT OPTIMIZATION (Invited Session organised by C. Fonteix and I. Marc)

[co-chairs: C. Fonteix, C. Drumond]

D1 A new experimental design for multicriteria optimization: Application to a biochemical synthesis. *Fonteix C.* (F), *R. Viennet* (F), *I. Marc* (F)

D2 A global strategy for the optimization of batch reactors: Application to the lactic acid synthesis by the alkaline degradation of fructose. *Garcia V.* (F), *M. Cabassud* (F), *M.V. Le Lann* (F), *L. Rigal* (F), *G. Casamatta* (F)

D4 Experimental design using genetic algorithm. Broudiscou A. (F), R. Phan-Tan-Luu (F), S. Comby (F)

D5 Robust product design through experimental modelling, with application to geotextile materials. Hadjihassan S. (F), E. Walter (F), I. Vuchkov (BG), L. Boyadjieva (BG), L. Pronzato (F)

D6 Methodological approach of the experimental research. Sergent M. (F), R. Phan-Tan-Luu (F), D. Mathieu (F)

E: MODELLING IN AGRICULTURAL PROCESSES I.
[Co-chairs: L. Sun, M. Neményi]

E1a A model for aeration management of stored grain based on Bayesian network. Zhu Z. (CHI), L. Sun (CHI)

E1b A stored grain management system based on graphic variable. Zhu Z. (CHI), L. Sun (CHI)

E2 A non-linear viscoelastic-plastic model for describing compaction processes. Sitkei G. (H)

E3 Numerical simulation of soil failure with tillage implements. Mouazen A.M. (H), M. Neményi (H)

E4 Mathematical modelling and simulation of corn drying in a fixed bed. Stakic M.B. (YU)

E5 Modelling of the thermal parameters in tobacco curing. Kerekes B. (H)

E6 Estimation and nonlinear control of an activated sludge wastewater treatment process. Nejjari F. (MA), A. Benhammou (MA), B. Dahhou (F), G. Roux (F)

F: ENERGY IN AGRICULTURE
[Co-chairs: J. Klima, B. Chudzik]

F1 Stand alone bio-gas power plants with induction generator and PWM voltage source inverter. Klima J. (CZ)

F2 Modelling and simulation of a solar thermal system. Buzás J. (H), I. Farkas (H), A. Biró (H), R. Németh (H)

F3 Optimisation of rural water systems. Chudzik B. (PL), S. Karambirow (RUS), J. Studzinski (PL)

F4 Determination of the surface heat transfer coefficient and thermal diffusivity in industrial measurements and their use in modelling and simulation of the thermal processes. Rajkó R. (H), F. Eszes (H)

F5 The influence of wheat-hardness on some granulometric and energetic characteristics of grinding. Véha A. (H), E. Gyimes (H)
G: MODELLING AND IDENTIFICATION  
[Chair: T. Nybrant]

G1 Mathematical methods for modelling and identification of nonlinear systems.  
Chalabi Z. (UK)  

H: MODELLING OF BIOCHEMICAL AND PHYSIOLOGICAL PROCESSES  
[Co-chairs: J.C. Merchuk, K. Bayer]

H1 Morphological structured model for hairy root cultures. Berzin I. (IL), D. Mills (IL), J.C. Merchuk (IL)  

H2 Modeling the kinetics of isobaric-isothermal inactivation of Bacillus subtilis \( \alpha \)-amylase with artificial neural networks. Geeraerd A.H. (B), C.H. Herremans (B), L.R. Ludikhuyze (B), M.E. Hendrickx (B), J. F. Van Impe (B)  

H3 Nonlinear qualitative signal processing for monitoring biological systems: application to the phytoplankton growth in bioreactors. Bernard O. (B), J.-L. Gouzé (F)  

H4 A simulation of retained microbial reactor system for simultaneous removal of carbonaceous and nitrogenous compounds in wastewater. Unno H. (J), M. Yanagida (J), X. Xing (J), Y. Tanji (J)  

H5 A new approach to bioprocess control by the analysis of regulatory networks. Bayer K. (A), M. Cserjan (A), E. Dürrschmid (A)  

H6 A kinetic model for beer production: simulation under industrial operational conditions. de Andrés-Toro B. (E), J.M. Girón-Sierra (E), C. Fernández-Conde (E), J.M. Peinado (E), F. García-Ochoa (E)  

H7 Modeling of inhibitory effect of lignin derivatives on the cellulase biosynthesis in Aspergillus niger cultures. Caramihai M.D. (RO), L. Jecu (RO)  

I: THEORETICAL ASPECTS OF MODELLING AND SIMULATION  
[Co-chairs: M. Shacham, L. Kuchar]

I1 Minimizing the effects of collinearity in polynomial regression. Brauner N. (IL), M. Shacham (IL)  


I3 A tutorial to clarify the vague image of fuzzy logic control. van Boxtel A.J.B. (NL), H. Gerritse (NL), H. Veen (NL)  

I4 Critical investigation of a rotating film evaporator to find optimal values of the factors by experimental design. Rajkó R (H), T. Pap (H), H. Mihálovics (H), G. Szabó (H)  

I5 Adaptive predictive control of an irrigation channel. Akouz K. (MA), A. Benhammou (MA), P.O. Malaterre (F)
J: GREENHOUSE CLIMATE CONTROL
[Chair: G. Bot]

J1 Energy saving potential of greenhouse climate control. Tantau H.-J. (D) 245

K: MODELS FOR QUALITY CONTROL
[Co-chairs: H. Murase, H.K. Purwadaria]

K1 Shape identification using a charge simulation retina model. Kanali C. (J), H. Murase (J), N. Honami (J) 253

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K3 Thermoluminescence of agro-food products interpreted with a solid-state physical band model. Kispéter J. (H), L.I. Kiss (H) 265

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K6 Mathematical model for non-destructive calculation of the morphological parameters of avian eggs. Narushin V.G. (UA) 283

L: MODELLING IN AGRICULTURAL PROCESSES II.
[Co-chairs: W. Huisman, I. Wachtler]

L1a The analysis of ventilation and indoor microclimate in agricultural buildings by Computational Fluid Dynamics (CFD). Mistriotis A. (NL), T. de Jong (NL), M. Wagemans (NL), G.P.A. Bot (NL) 289

L1b A simulation study of energy saving prospects of combined heat and power in horticulture in the Netherlands. de Zwart H.F. (NL), G.P.A. Bot (NL) 297

L2 Analysis of the vibration-excitation effect caused by deformable soil surfaces. Laib L. (H) 305

L3 Simulation model for ploughing. Tóth Z. (H), B. Turányik (H), I. Wachtler (H) 311

L4 Aprochops, a model for optimisation of the primary production costs of biomass crops. Huisman W. (NL) 317

L5 Modeling the compression test process of fruits. Fekete A. (H) 323

M: CLOSING

I. Farkas, Symposium Chairman
R. Hanus, IMACS representative
Y. Hashimoto, IFAC CC Chairman