Alexandros Koulouris

Chemical Engineer, PhD
Associate Professor
Dept. of Food Technology
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RESEARCH INTERESTS

Process systems engineering, methods and tools for process design, modeling and optimization, process simulation software in education, operations management and scheduling, system identification and control with neural networks.

EDUCATION

Massachusetts Institute of Technology (Cambridge, MA) 1995
Ph.D. in Chemical Engineering. GPA: 4.8/5.0
Thesis Title: "Multiresolution Learning in Nonlinear Dynamic Process Modeling and Control"

Massachusetts Institute of Technology (Cambridge, MA) 1991
MSCEP: M.S. in Chemical Engineering Practice. GPA: 4.8/5.0

Aristotle University of Thessaloniki (Thessaloniki, Greece) 1988
Diploma in Chemical. GPA: 9.34/10.00

ACADEMIC EXPERIENCE / TEACHING

Associate Professor (ATEI Thessaloniki – Dept. of Food Technology) (2008-today)
- Courses taught: Food Engineering I, Food Process Design, Laboratories for Food Processing II
- Participant in the graduate MS program entitled "Quality control and operations management systems in the food industry". Course taught: Production Systems Design and Operation.

Adjunct Professor (ATEI Thessaloniki – Dept. of Food Technology) 2004-2007
- Courses taught: Food Process Design (undergraduate course), Information Technology Applications in the Food Industry (graduate course)

Training Course Instructor   (Intelligen, Inc.) 1999-2007
Taught 2-day training course seminars on batch process design, scheduling and optimization with the use of the software tools SuperPro Designer and SchedulePro. Courses taught at universities and industrial sites and attended by professors, researchers and industrial scientists and engineers. Indicative course venues:
- *Universities*: Technical University of Delft/Netherlands, Saarland University/Germany, University of Roma-La Sapienza/Italy, National University of Singapore/Singapore, Seoul National University/S. Korea, Universiti Teknologi Malaysia/ Malaysia
- *Industries*: Sanofi-Aventis/France, Roche, Serono, Lonza, Nestlé/Switzerland, Astra-Zeneca, Pharmadule/Sweden, Boehringer-Ingelheim/Austria

Teaching Assistant (Massachusetts Institute of Technology)
- Integrated Chemical Engineering 1993, 1998
- Process Thermodynamics 1992

ACADEMIC EXPERIENCE / RESEARCH

Postdoctoral Research Associate (Massachusetts Institute of Technology)　　　1995-1999

Participation in the research team responsible for the design and development of the object-oriented phenomena-based process modeling language MODEL.LA. Project conducted jointly by MIT and UC Berkeley under an NSF research fund. Designed and developed the following functional modules of MODEL.LA: physical properties manager and databases, thermodynamic engine, process control and scheduling. Also involved in user software training in industry (Mitsubishi Chemicals/Japan) and academia (MIT, UC Berkeley).

PhD Student (Massachusetts Institute of Technology)　　　1991-1995

- Development and analysis of a Wave-Net neural netowrk based on the theory of wavelets
- Development of learning algorithm for Wave-Net from a continuous feed of process measurements
- Application of Wave-Net in model identification and nonlinear model predictive control

Postgraduate Researcher (Chemical Process Research Engineering Institute, Thessaloniki)　　　1988-1989

Participation in research project for the oxidative coupling of methane to ethylene: performed kinetic studies and evaluated alternative reactor configurations.

Undergraduate Student- Diploma Thesis (Aristotle University of Thessaloniki)　　　1988

Developed kinetic model of the thermal and catalytic steam-cracking of n-hexane.

WORK EXPERIENCE

Business Development Manager (for Intelligen, Inc. in Greece)　　　2001-2008

- Development of new software tools (SchedulePro) in the Intelligen Suite™ line of products
- Recruiting, training and supervision of development engineers working with Intelligen in Greece
- Technical support and consulting services to Intelligen customers in Europe/Asia
- Training courses, presentations in scientific and technical conferences

Senior Development Engineer (Intelligen, Inc., Scotch Plains, NJ)　　　1999-2001

- Development of new and improvement of existing features in Intelligen's process simulator, SuperPro Designer, for the design, modeling and optimization of processes in the fields of pharmaceutical, biotechnological and food industries
- Consulting services to software users

Industrial Intern Consultant (Dow Chemical, MI/General Electric Company, NY)　　　1990

Participated in four monthly team industrial projects in fulfillment of the obligations of the MIT-MSCEP program. Projects involved laboratory experimentation and use of process simulation for the modeling and optimization of industrial processes.

AWARDS/HONORS
- Greek National Fellowship (1983-1988).
- MIT-Ralph Landau Fellowship (1989)
- PhD research and teaching fellowships (1990-1995)

COMPUTER SKILLS
Programming: C, Visual and Borland C++, FORTRAN, BASIC, HTML, SmallTalk, Pascal
Operating Systems: WINDOWS Vista/XP/2000/NT/98/95, UNIX, VMS
Databases: BDE, ODBC, OLE DB, MS Access, SQL
Applications: SuperPro Designer, SchedulePro, MATLAB, ASPEN PLUS, gPROMS, FLUENT

PROFESSIONAL AFFILIATIONS
Affiliate Member, AIChE (1992)
Member, ISPE (2003)
Member, Technical Chamber of Greece (1988)

LANGUAGE SKILLS

Greek : mother tongue

English: Cambidge Certificate of Proficiency in English (1989). Graduate studies and work in USA (1989-2001)

French: Diplôme d' Etudes Françaises (1981)

SELECTED PUBLICATIONS

Book Chapters

Petrides D., A. Koulouris, C.A. Siletti, J. Jimenez, P. Lagonikos, "The role of simulation and scheduling tools in the development and manufacturing of active pharmaceutical ingredients", in *Chemical Engineering in the Pharmaceutical Industry: from R&D to Manufacturing*, John Wiley & Sons (2010)

Papavasileiou, V., C.A. Siletti , A. Koulouris, and D. Petrides, "Bioprocess Design, Computer-Aided," in *Encyclopedia of Industrial Bioprocess, Bioseparation and Cell Technology*, editor M.C. Flickinger, John Wiley & Sons (2009)

Koulouris, A., B. Bakshi, and G. Stephanopoulos, "Empirical Learning Through Neural Networks: the *Wave-Net* Solution", in *Advances in Chemical Engineering*, Academic Press (1995)

Bakshi, B., A. Koulouris, and G. Stephanopoulos, "Learning at Multiple Resolutions: Wavelets as Basis Functions for Artificial Neural Networks and Inductive Decision Trees", in *Wavelet Applications in Chemical Engineering*, Kluwer Academic Publishers (1994)

Scientific Journals/Conferences with Referred Proceedings

Papavasileiou, V., A. Koulouris, C.A. Siletti and D. Petrides, "Optimize manufacturing of pharmaceutical products with process simulation and production scheduling tools," *Chemical Engineering Research & Design*, **85** (A7), pp1086-1097 (2007)

Koulouris, A., C.A. Siletti and D.P. Petrides, "Scheduling Challenges in Biopharmaceutical Manufacturing," *Computer Aided Chemical Engineering*, **24**, pp589-594 (2007)

Petrides, D., A. Koulouris and V. Papavasileiou, "Analysis and Retrofit Design of Biological Wastewater Treatment Facilities Using Process Simulation Tools", *Journal of Biotechnology*, **131**, **2**, pS268 (2007)

Koulouris, A., C.A. Siletti and D.P. Petrides, "A Resource-Constrained Scheduling Tool for Batch Biopharmaceutical Processing*," PSE Asia, 2005*, pp131-135, (2005)

Siletti, C.A, A. Koulouris, and D.P. Petrides, "Optimization of Biopharmaceutical Manufacturing with Scheduling Tools – Experiences from the Real World," *Computer Aided Chemical Engineering*, **20**, part 2, pp1045-1050 (2005)

Koulouris, A., D.P. Petrides, "Cycle Time and Throughput Analysis in Batch Biochemical and Pharmaceutical Processing,"*Computer Applications of Biotechnology 2004*, Elsevier (2004)

Koulouris, A., C.A. Siletti, D.P. Petrides, "Throughput Analysis of Batch Biochemical and Pharmaceutical Processes with Simulation and Scheduling Tools," *Computer Aided Process Engineering*, **18**, pp943-948 (2004)

Tan, J., D.C.Y. Foo, S. Kumaresan, R.A. Aziz, A. Koulouris, "Evaluation of Debottlenecking Strategies for a Liquid Medicine Production Utilizing Batch Process Simulation", Lecture Series on Computer and Computational Sciences, ICCMSE 2004, pp666-670 (2004)

Petrides, D.P., A. Koulouris, and P. Lagonikos, "The Role of Process Simulation in Pharmaceutical Process Development and Product Commercialization," *Pharmaceutical Engineering*, **22**, p56-65 (2002)

Koulouris, A., J. Calandranis, and D. Petrides, "Throughput Analysis and Debottlenecking of Integrated Batch Chemical Processes," *Computers and Chemical Engineering*, **24**, p. 1387-1394 (2000)

Foss, A.S., K. R. Guerts, P. J. Goodeve, K. D. Dahm, G. Stephanopoulos, J. Bieszczad and A. Koulouris, "A Phenomena-Oriented Environment for Teaching Process Modeling: Novel Modeling Software and Its Use in Problem Solving," *Chemical Engineering Education*, Fall 1999, p.292-299 (1999)

Bieszczad, J., A. Koulouris, and G. Stephanopoulos, "MODEL.LA: A Phenomena-based Modeling Environment for Computer-Aided Process Design," *Fifth International Conference on Foundations of Computer-Aided Process Design*, AIChE Symposium Series No.323, **96** (1999)

A. Koulouris, and G. Stephanopoulos, "Stability of NN-based MPC in the Presence of Unbounded Model Uncertainty," in *Fifth International Conference on Chemical Process Control*, AIChE Symposium Series, **93** (1997)

Koulouris, A., and G. Stephanopoulos, "Model Learning in MPC: An Intelligent Control Formulation," in *International Conference on Intelligent Systems in Process Engineering*, AIChE Symposium Series, **92** (1996)

Lemonidou, A., A. Koulouris, D. Varvarezos, and I. Vasalos, "A Mechanistic Model for the Catalytic Cracking of n-Hexane over Calcium Aluminate Catalysts for Producing Light Olefins", *Applied Catalysis*, **69**, 105 (1991)

Professional Journals
Papavasileiou, V., A. Koulouris, C. Siletti and D. Petrides, "The Role of Process Simulation and Schedulilng Tools in the Development and Manufacture of Pharmaceutical Products", Pharmaceutical Technology, Nov 1 issue (2007)

Koulouris, A., D.P. Petrides, "See the Optimum- Batch Process Optimization via CAPD and Simulation*," PROCESS Worldwide*, **2**, p38-40 (2002)

Petrides, D.P., A. Koulouris, and C. Siletti, "Throughput Analysis and Debottlenecking of Biomanufacturing Facilities: A Job for Process Simulators," *Biopharm*, August Issue, p2-7 (2002)

PRESENTATIONS

Conferences with no Proceedings or Referees
Koulouris A., T. Karapantsios and S. Raphaelidis, "Experience from the Use of Process Simulation in Food Process Design Courses," 5th Panhellenic Symposium on Chemical Engineering, Thessaloniki (2005)

Koulouris A., E. Achilleos and D. Petrides, "Throughput Analysis, Debottlenecking and Optimization of Integrated Batch Chemical Processes," 3rd Chemical Engineering Conference for Collaborative Research in Eastern Maditerranean, Halkidiki (2003)

Nirupam, P., A. Koulouris, and D. Petrides, "SuperPro Designer: An Interactive Software Tool for Designing and Evaluating Integrated Chemical Manufacturing Processes," Annual AIChE Meeting, Reno NV (2001)

Petrides, D.P., P.Lagonikos, and A. Koulouris, "The Role of Modeling in Process Development and Technology Transfer," Annual AIChE Meeting, Los Angeles CA (2000)

Dahm, K., J. Bieszczad, A. Koulouris, A. Foss, and G. Stephanopoulos, "The MODEL.LA Modeling Laboratory – An Integrated Tool for Syntheis, Modeling, and Analysis in Chemical Engineering Education," Annual AIChE Meeting, Los Angeles CA (2000)

Petrides, D.P., and A. Koulouris, "The Role of Computer-Aided Process Design and Simulation in Pollution Prevention and Control," Annual AIChE Meeting, Los Angeles CA (2000)

Petrides, D.P., A. Koulouris, and J. Calandranis, "Evaluation of Water Recycling Options at a Semiconductor Fabrication Plant Using Process Simulation," International Water Conference, Pittsburgh (2000)

Petrides, D.P., A. Koulouris, and J. Calandranis, "The Role of Computer-Aided Design and Simulation in Pollution Prevention and Control," Spring AIChE Meeting, Atlanta GA (2000)

Koulouris, A., J. Bieszczad, and G. Stephanopoulos, "Representing Non-conservation Entities in a Phenomena-Based Modeling Environment", Annual AIChE Meeting, Dallas TX (1999)

Bieszczad, J., A. Koulouris, K. Geurts, and G. Stephanopoulos, "*MODEL.LA*: A Phenomena-Based Modeling Language for Process Systems Engineering", Annual AIChE Meeting, Miami FL (1998)

Bieszczad, J., A. Koulouris, K. Geurts, P. Goodeve, A. Foss, and G. Stephanopoulos, "Phenomena-Based Modeling Using MODEL.LA--Enabling Students and Computers to Communicate in the Language of Chemical Engineering", Annual AIChE Meeting, Miami FL (1998)

Ohshima, M., A. Koulouris, S. Tomita, and G. Stephanopoulos, "*Wave-Net* based On-line Quality Inference System for Polymerization Processes", 4th IFAC Symposium on Dynamics and Control of Chemical Reactors, Distillation Columns and Batch Processes, Helsingor, Denmark (1995)

Koulouris, A., M. Ohshima, and G. Stephanopoulos, "The L-inf Extension of *Wave-Nets* for On-Line Identification", Annual AIChE Meeting, San Fransisco CA (1994)

Koulouris, A., J. Song, and G. Stephanopoulos, "*Wave-Net* Modeling Error Estimates for Model Predictive Control", Annual AIChE Meeting, San Fransisco CA (1994)

Bakshi, B., A. Koulouris, and G. Stephanopoulos, "*Wave-Nets*: Novel Learning Techniques, and the Induction of Physically Interpretable Models", SPIE conference, Orlando FL (1994)

Koulouris, A., B. Bakshi, and G. Stephanopoulos, "Modeling and Characterization of Nonlinear Systems Using *Wave-Nets*", Annual AIChE Meeting, Miami FL (1992)

Vasalos, I., A. Koulouris, and D. Varvarezos, "Reactor Scale-up Factors for the Oxidative Coupling of Methane to Ethylene", 2nd European Workshop on Catalytic Methane Activation, Enschede, The Netherlands (1989)

Invited Lectures

Koulouris, A., "New Developments in Biochemical Process Modeling, Scheduling and Optimization", Symposium of SuperPro Designer Users, Kuala Lumpur (2005)

Koulouris, A., "Batch Process Modeling, Scheduling and Optimization", FINE'04 A Symposium for the Pharmaceutical and Fine Chemical Industry, Stockholm (2004)

Koulouris, A., "Design, Scheduling and Optimization of Batch Industrial Processes with the Use of the Intelligen Suite software," Symposium on IT Applications in Industry, organized by the Hellenic Assocaition of Chemical Engineers, Athens (2003)