

Vassilis Gaganis

Curriculum Vitae

Contact

Department of Mineral Resources Engineering
Technical University of Crete
Chania, Greece, 73100
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Education

Ph.D in Reservoir Engineering, 2006

Technical University of Crete, Greece

Department of Mineral Resources Engineering

Dissertation: Process modeling using sensitivity analysis and artificial neural networks

Supervisor: Prof. Nikos Varotsis

M.Sc in Reservoir Engineering, 1997

Technical University of Crete, Greece

Department of Electronic and Computer Engineering

Dissertation: Development of ANN models to predict PVT and physical properties of reservoir fluids

Supervisor: Prof. Nikos Varotsis

B.Sc in Mechanical Engineering, 1995

University of Patras, Greece

Department of Mechanical Engineering

Dissertation: Computer-aided modal analysis of rotor-bearing systems under seismic excitation

Supervisor: Prof. C. Papadopoulos

Professional experience

2006-present *Senior research scientist in Department of Mineral Resources Engineering, Technical University of Crete*

- Application of machine learning methods in reservoir engineering
- Modeling of phase behavior for reservoir simulation and pipeline flow

1997-present *Consultant for Schlumberger Fluids Center, Aberdeen, UK and Clamart, Paris, France*

- Modeling of phase behavior for sampling devices
- Multiphase flowmetering

1995-1997 *Research assistant in Department of Electronic and Computer Engineering, Technical University of Crete*

- Control of manufacturing systems
- Machine learning

Research interests

PVT and phase behavior of reservoir fluids

EoS modeling

Acceleration of reservoir and pipeline flow simulation

Pattern recognition and machine learning methods for modeling reservoir engineering problems

Computational thermodynamics

Research highlights

Neural network-based models for the prediction of reservoir fluids PVT properties

Machine learning-based models for the downhole prediction of reservoir fluid GOR

Numerical method for correcting multiphase flowmeter measurements against line conditions

Software for automated treatment of reservoir fluid GC signals

New computational methods for speeding up the solution of the stability and phase-split problems

Research projects - consultancy work for the industry

Development of pattern recognition-based tools for the on-site prediction of the properties of a full PVT report with the PVT Express service, Schlumberger Wireline & Testing, Clamart, France

Development of a quality assurance-uncertainty estimation tool for the PVT Express service, Schlumberger Wireline & Testing, Clamart, France

Development of pattern recognition-based tools for predicting PVT properties for the Vx flowmeter, Oilphase Division of Schlumberer, Aberdeen, UK

Method for correcting the flowing phases properties against alternating line conditions for the Vx flowmeter, Oilphase division of Schlumberer, Aberdeen, UK

Sensitivity analysis of measurements uncertainty for the Vx flowmeter, Oilphase division of Schlumberer, Aberdeen, UK

Evaluation of a round-robin test results on PVT Express as chromatography equipment, Oilphase division of Schlumberer, Aberdeen, UK

Development of neural network-based algorithms for the downhole prediction of reservoir fluids GOR, Schlumberger Wireline & Testing, Sugarland, TX, US

Development of a fully automated GC-processing software for reservoir fluids, Oilphase division of Schlumberer, Aberdeen, UK

Use of pattern recognition methods for speeding up phase behavior calculations in reservoir simulation, Schlumberger SiS, Abingdon, UK

Evaluation of phase behavior calculations acceleration by use of proxy models, Kappa engineering, Sophia-Antipolis, France

Patents

US patent 7966273, 2011, *Predicting formation fluid property through downhole fluid analysis using artificial neural network*, by P. Hegeman, C. Dong, C. Woodburn, G. Birkett, N. Varotsis, V. Gaganis (Schlumberger Technology Center)

Publications

Journal papers

Gaganis V., Varotsis N., “An improved BIP matrix decomposition for fast reduced flash calculations”, to appear in *Fluid phase equilibria*, 2012.

Gaganis V., Varotsis N., “A general framework of model functions for rapid and robust solution of Rachford-Rice type of equations”, *Fluid phase equilibria*, Vol. 322-323, pp. 9-18, 2012.

Gaganis V., Varotsis N., “Non-iterative flash calculations for process simulation using discriminating functions”, *Fluid phase equilibria*, Vol. 314, pp. 69-77, 2011.

Hegeman P., Dong C., Varotsis N., **Gaganis V.**, “Application of Artificial Neural Networks to Downhole Fluid Analysis”, *SPE Reservoir Evaluation & Engineering*, Vol. 12, No. 1, pp. 8-13, 2009.

Gaganis V. and Pasadakis N., "Characterization of Oil Spills in the Environment Using Parallel Factor Multivariate Analysis", *Analytica Chimica Acta*, Vol. 573-574, pp. 328-332, 2006.

Pasadakis N., **Gaganis V.**, Foteinopoulos Ch., "Octane Number Prediction for Gasoline Blends", *Fuel Processing Technology*, Vol. 87, pp. 505-509, 2006.

Varotsis N., **Gaganis V.**, "Quality Assurance Tool for PVT Simulator Predictions", *SPE Reservoir Evaluation & Engineering*, Vol. 5, No. 6, pp. 499-506, 2002.

Pasadakis N., **Gaganis V.**, Varotsis N., “Accurate Determination of Aromatic Groups in Heavy Petroleum Fractions Using HPLC UV-DAD”, *Fuel*, Vol. 80, pp. 147-153, 2001.

Gaganis V., Zhsimopoulos A., Nikolakopoulos P. and Papadopoulos C. “Modal Analysis of Rotor on Piecewise Linear Journal Bearings Under Seismic Excitation”, *Journal of Vibration and Acoustics*, Vol. 121, No. 2, pp. 190-196, 1999.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., “Real-Time Control of Manufacturing Cells Using Dynamic Neural Networks”, *Automatica*, Vol. 35, pp. 139-149, 1999.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "Neuro Schedulers for Flexible Manufacturing Systems", *Computers in Industry*, Vol. 39, pp. 209-217, 1999.

Varotsis N., Pasadakis N., **Gaganis V.** “A Novel Approach for the Characterization of Aromatics in Petroleum Fractions using HPLC-UV-DAD and Evolving Factor Analysis”, *Fuel*, Vol.77, No.13, pp.1495-1502, 1998.

Christodoulou M. and **Gaganis V.**, “Neural networks in manufacturing cell design, *Computers in Industry*, Vol. 36, pp. 133-138, 1998.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "Manufacturing Systems Modeling using Neural Networks", *Journal of Studies in Informatics and Control*, Vol. 6, No. 1, pp. 37-47, 1997.

Gaganis V., Zhsimopoulos A., Nikolakopoulos P. and Papadopoulos C. "Modal Analysis of Rotor on Piecewise Linear Journal Bearings Under Seismic Excitation", *ASME Petroleum Division*, Vol. 73, No. 1, pp. 31-38, 1996.

Peer-reviewed papers in conference proceedings

Gaganis V., Varotsis N., "Novel approach to the reduced variables method improves phase equilibrium computations accuracy", to be presented in 26th European Symposium on Applied Thermodynamics, Berlin, Germany, October 2012.

Gaganis V., Varotsis N., "Machine learning methods to speed up compositional reservoir simulation", SPE paper 154505, SPE Europec, Copenhagen, Denmark, June 2012.

Gaganis V., Varotsis N., "A new transformation for the rapid solution of the Rachford-Rice equation in phase split calculations", SPE paper 150932, North Africa Technical Conference and Exhibition, Cairo, Egypt, February 2012.

Gaganis V., "A fast and robust method for solving the mass-balance equation in phase-split calculations", 4th International Conference on Experiments/Process/System modeling/Simulation/Optimization, Athens, Greece, July 2011.

Gaganis V., Varotsis N., "The risk of non-physically sound tuned cubic EoS models: Critical appraisal and remedies", 23th European Symposium on Applied Thermodynamics, Cannes, France, May 2008.

Hegeman P., Dong C., Varotsis N., **Gaganis V.**, "Application of artificial neural networks to downhole fluid analysis", International Petroleum Technology Conference, Dubai, UAE, December 2007.

Gaganis V., Varotsis N., Birkett G., "Sensitivity Controlled Neural Networks for the Prediction of PVT Properties Exhibit Equation of State like Behavior", 22th European Symposium on Applied Thermodynamics, Elsinore, Denmark, June 2006.

Pasadakis N., **Gaganis V.**, "Characterization of oil spills in the environment using parallel factor multiway analysis", International Conference on Instrumental Methods of Analysis, Modern Trends & Applications, Heraklion, Greece, October 2005.

Gaganis V., Pasadakis N., "Octane number prediction and optimization for gasoline blends using artificial neural networks", International Conference on Experiments/Process/System modeling/Simulation/Optimization, Athens, Greece, July 2005.

Gaganis V., Varotsis N., "Sensitivity Controlled Neural Networks for the prediction of thermodynamic properties of fluids", International Conference on International Conference on Experiments/Process/System modeling/Simulation/Optimization, Athens, Greece, July 2005.

Gaganis V., Varotsis N., "Monitoring PVT properties ensures physically sound tuned EoS behavior over the entire operating conditions range", SPE Europec, Madrid, Spain, June 2005.

Stamboliadis E., **Gaganis V.**, "Application of computer assisted mathematical analysis for the interpretation of mineral grinding data", International Conference SCCE, "From scientific computing to computational engineering", Athens, Greece, July 2004.

Gaganis V., Pasadakis N., Smaragdis P., Varotsis N., "Deconvolution of overlapping HPLC peaks or aromatic hydrocarbons using Independent Components Analysis", *Advances in Chromatography and Electrophoresis-Conferentia Chemometrica*, Budapest, Hungary, October 2003.

Pasadakis N., **Gaganis V.**, Smaragdis P., "Independent Components Analysis (ICA) in the deconvolution of overlapping HPLC peaks of oil", *International Conference on Instrumental Methods of Analysis, Modern Trends & Applications*, Thessaloniki, Greece, September 2003.

Varotsis N., **Gaganis V.**, Nighswander J., "An innovative ANN-based thermodynamic petroleum fluids properties model providing quality assured predictions", Poster presentation, 19th European Symposium on Applied Thermodynamics, Santorini, Greece, September 2002.

Varotsis N., **Gaganis V.**, Nighswander J. (all by Oilphase Division of Schulberger EPS) "Quality Assurance Tool for PVT Simulator Predictions", Middle East Oil Show and Conference, Al Manhama, Bahrain, March 2001.

Varotsis N., **Gaganis V.**, Nighswander J., Guieze P (all by Oilphase Division of Schulberger EPS) "A Novel Non-Iterative Method for the Prediction of the PVT Behavior of Reservoir Fluids", SPE Annual Conference, Houston, Texas, UK, October 1999.

Pasadakis N., **Gaganis V.**, Varotsis N., "An improved Method for the Separation of Aromatics Groups in heavy Petroleum Fractions by HPLC Analysis", *International Conference of Instrumental Methods of Analysis – Modern Trends and Applications*, Chalkidiki, Greece, September 1999.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "High Order Neural Networks to Control Manufacturing Systems – A Comparison Study", CDC Conference on Decision and Control, Dec. 16-18, 1998.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "Applying High Order Neural Nets to Adaptively Control Manufacturing Systems – A Comparison With Existing Techniques", ASI'98 Conference, Bremen, Germany, June 14-17, 1998.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "Dynamic Neural Networks for Real-Time Adaptive Control of FMS", CDC Conference on Decision and Control, Dec. 10-12, 1997.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "Dynamic Neural Networks for Real Time Manufacturing Cell Scheduling", 5th IEEE Mediterranean Symposium on New Directions in Control and Automation, Pafos, Cyprus, July 1997.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "An Adaptive Control Method for Real Time Scheduling of Manufacturing Cells", ASI'97 Conference, Budapest, Hungary, July 1997.

Gaganis V., Kouikoglou V. and Christodoulou M., "Manufacturing Education : The Hellenic Experience", *International Symposium on Issues and Challenges of Manufacturing and Control Education for the 21st Century*, Patras, Greece, June 1997.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "A Recurrent Neural Network Model to Describe Manufacturing Cell Dynamics", CDC Conference on Decision and Control, Kobe, Japan, Dec. 11-13, 1996.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., "Neural Adaptive Control Techniques with Applications in Continuous and Discrete Event Systems: Dc Motor

Regulation and FMS Scheduling”, NACT-II Workshop, Daimler-Benz Systems Technology Research, Berlin, Germany, Sep. 9-10, 1996.

Gaganis V., Zervakis M and Christodoulou M., “Neural Nets and Multichannel Image Processing Applications”, COMPARES Conference, London, UK, July 1996.

Gaganis V., Zhsimopoulos A., Nikolakopoulos P., Papadopoulos C., “Modal analysis on piecewise linear journal bearings under seismic excitation”, Engineering Systems Design and Analysis conference, ASME, Montpellier, France, July 1996.

Gaganis V., Zhsimopoulos A., Nikolakopoulos P. and Papadopoulos C., “Response Calculation of Rotating Rotor-Bearing System Using a Simplified Modal Analysis”, 2nd National Congress on Computational Mechanics, Chania, Greece, June 1996.

Gaganis V., Zhsimopoulos A., Nikolakopoulos P. and Papadopoulos C., “Response Calculation of Piece-Wise Linear Rotating Rotor-Bearing Systems Using Modal Analysis”, 2nd National Congress on Computational Mechanics, Chania, Greece, June 1996.

Christodoulou M. and **Gaganis V.**, “Determining Manufacturing Cell Topology Using Neural Networks”, 4th IEEE Med. Symposium on New Directions in Control and Automation, Chania, Greece, June 10-13, 1996.

Christodoulou M. and **Gaganis V.**, “Neural Networks in Manufacturing Cell Design”, ASI’96 Conference, Toulouse, France, June 2-6, 1996.

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M. “Identification of Manufacturing cell Dynamics Using Recurrent Neural Networks”, ASI’96 Conference, Toulouse, France, June 2-6, 1996

Rovithakis G., **Gaganis V.**, Perrakis S. and Christodoulou M., “A Neural Network Approach in Manufacturing Cell Dynamics Modeling”, 4th IEEE Mediterranean Symposium on New Directions in Control and Automation, Chania, Greece, June 10-13, 1996.

Chapters in books

Gaganis V., Zervakis M, Christodoulou M., “Neural Nets and Multichannel Image Processing Applications”, in Neurocomputation in Remote Sensing Data Analysis, I. Kanellopoulos, G. Wilkinson, f. Roli (Editors), Springer Verlag, 1997.

Rovithakis G., **Gaganis V.**, Perrakis S., Kodogiannis V., Christodoulou M, "A Neural Adaptive Control Technique for Manufacturing Cell Scheduling" in Applications of Neural Adaptive Control Techniques, Hunt, K. (Ed), World Scientific, 1997.

Rovithakis, G., **Gaganis, V.**, Perrakis, S., Christodoulou, M, “Discrete Event Complex systems: Scheduling with Neural Networks” in Dealing with Complexity: a Neural Network Approach, Warwick K. (Ed), Springer, 1997.

Teaching experience

Undergraduate courses, Dept of Mineral Resources Engineering, Technical University of Crete

2007-2010 *Reservoir fluids phase behavior*
- reservoir fluid thermodynamics
- phase diagrams
- properties of fluids

- correlations
- EoS modeling

- 2007-2010 *Reservoir engineering*
- flow equations
 - relative permeability
 - rock-fluid interaction
 - mass balance models
 - drive mechanisms

Honors

1st prize in National Mathematical Olympiad, 1987

1st prize in Local Mathematical Olympiad, 1987, 1988, 1990

Service

External reviewer for Journals

Chemometrics and Intelligent Laboratory Systems

International Journal of Environmental Analytical Chemistry

International Journal of Oil, Gas and Coal Technology

Simulation Modeling Practice and Theory

Miscellaneous

H index: 6 (Scopus, Sep 2012)

Citations by others: 90 (Scopus, Sep 2012)