

Optimization Expert | Modeling Specialist | Experienced Researcher

A results oriented Dr. in Chemical Engineering with a focus on Computer Science methods and automated decision making, with experience in mathematical analysis & optimization, software development and energy, financial & pharmaceutical projects, coordinating and leading international teams of scientists & engineers, eager to apply professional experience – with strong motivation – in the consulting services sector.

Areas of Expertise – Key strengths:

Quantitative research & Analysis | Solution planning | Automated decision making via optimization | Uncertainty hedging | Organization & Leadership | Resilience & Perseverance | High-level achievement standards | Perceptiveness | Adaptability & Flexibility

Career Highlights:

Project lead in energy projects with ExxonMobil & Shell, in pharmaceutical projects with Eli Lilly and in financial projects with Brevan Howard (2015 – 2019) | Group Lead of Optimization in Octeract (2020 – 2021) | Academic Group Lead at Texas A&M University (2017 – 2019) | Author and co-author of 2 books & 34 peer-reviewed papers and presenter of 10 international conference presentations (2014 – 2019).

PROFESSIONAL OVERVIEW

Asst. Professor of System Dynamics & Process Control | Sep.'22 –

School of Chemical and Environmental Engineering, Technical University of Crete, Chania, Greece
Teaching and co-teaching Linear Algebra, Applied Mathematics for Chemical and Environmental Engineers, Process Optimization and System Dynamics & Process Control. Researching the effect of various kinds of uncertainty on rolling horizon and design optimization problems in process systems engineering.

Lead Optimization Engineer | Jan.'19 – Jul.'21

Octeract Ltd., London, UK

Training and leading the optimization team to develop mathematical optimization algorithm prototypes for the Octeract Engine, a massively parallel global optimization solver engine for automated decision making and reformulation, in C++ and Python. Understanding the clients' problem and designing the solution approach. Working on a project based and day-to-day setting. Communicating the needs and ideas between the developer team and sales team. Involved in achieving collaborations with resellers AIMMS, AMPL and GAMS modeling software companies.

Postdoctoral Research Associate | Jul.'17 – Jan.'19

Texas A&M Energy Institute, College Station, Texas, USA

Organizing, leading and training a multi-disciplinary team of 16 PhD and Masters students to perform high-quality research in several areas and applications of optimization. Responsible for day-to-day project supervision. Academic research lead on energy projects with (a) ExxonMobil: for the development of the “digital twin” of processes (b) Shell for the utilization of remote energy resources and on pharmaceutical projects with Eli Lilly. Co-developer of two academic software tools for optimization under uncertainty. Authored two academic books. Teaching (primary and assistant tutor) of 2 postgraduate courses.

External Research Associate | May'16 – Jan.'17

University College London, London, UK

External project associate in optimization of multi-scale energy generation under demand uncertainty. Collaborated with students and academics to design, integrate and apply solution strategies for different types of demand uncertainty via a range a mathematical methodologies for automated decision making and a series of technological availability.

Research Associate | Mar.'13 – Jul.'13

Imperial College London, London, UK

Research associate in optimization and control of process systems under uncertainty (via multi-parametric programming). Teaching (primary and assistant tutor) of 2 postgraduate courses and one undergraduate course in optimization and numerical methods.

Intern in the department of Chemical Technology and Environment | Jul.'09 – Aug.'09

Public Power Corporation S.A., Keratea-Lavrion, GR

Responsible for collecting, evaluating and the daily environmental measurements for air pollution associated with the plant operation. Involved in the design of a sea water purification system for cooling via reverse osmosis, including determining specifications and operational & investment costs.

EDUCATION

PhD in Chemical Engineering Imperial College London, London (UK)	Jul.'13 – Jul.'17
Visiting PhD Student Texas A&M University, College Station (TX, USA)	May'15 – Jul.'17
MSc in Chemical Engineering Imperial College London, London (UK)	Oct.'11 – Sep.'12
Diploma in Chemical Engineering National Technical University of Athens, Athens (GR)	Sep.'05 – Jul.'11
Athens College Hellenic-American Educational Foundation, Psychiko (GR)	Sep.'99 – Jun.'05

DISTINCTIONS & FUNDED PROJECTS

US Department of Energy | 2018

Texas A&M Energy Institute, during my role as a Postdoctoral Research Associate

Involvement in the preparation of the collaborative proposal for the project “Smart Manufacturing for Chemical Processing: Energy Efficient Operation for Air Separation Unit”

Status: Funded [USD 2.69M], completed.

National Science Foundation | 2015 – 2016

Texas A&M University, during my role as a Visiting PhD Student

Involvement in the preparation of the proposal for the project “SusChEM: An integrated framework for process design, control and scheduling [PAROC]”

Status: Funded [USD 196.776], completed.

Engineering and Physical Sciences Research Council | 2013 – 2014

Imperial College London, during my role as a PhD Student

Involvement in the preparation of the collaborative proposal for the project “U Psi Psi: Uncertainty-Aware Planning and Scheduling in the Process Industries”

Status: Funded [GBP 1.54M], completed.

Excellence Award in Recognition of Outstanding PhD Thesis on CAPE | 2017

Imperial College London, during my role as a PhD Student

Third place.

Distinguished Junior Researcher Seminar Series 2016 | 2016

Northwestern University, Chicago, Illinois, USA, during my role as a PhD Student

Invited speaker to deliver a presentation on my research on “A multi-scale energy systems engineering approach to the co-generation of heat and power”.

Selected among +100 applicants.

CPSE Autumn Industrial Consortium Meeting | 2014

Imperial College London, during my role as a PhD Student

Best Poster Presentation co-recipient.

RESEARCH PROFILE

Foundation: Optimal model-based receding horizon strategies, simultaneous design and operational optimization, academic software toolbox development in multi-parametric optimization (PAROC & POP), extensions to robust optimization and nonlinear optimization.

Application: Chemical and pharmaceutical processes, energy systems and microgrids, finance.

h-index: 15, *citations:* 752, Google Scholar as of 04/10/21.

SKILLS & LANGUAGES

Greek: native speaker; English: excellent command; German: basic command;

Software: Octeract Engine; GAMS; AIMMS; AMPL; Python; Pyomo; R; C++; gPROMS, MATLAB; Github; Bash; LaTeX; Microsoft Office; Ubuntu; macOS; Microsoft Windows; etc.

INTERESTS

Practical philosophy; psychology of the masses; history of the 20th century; speed cubing; DIY computer networks; video games; rock music (novice guitar apprentice); extreme sports (bunjee jumping); swimming

PUBLICATIONS

Books and theses

1. Pistikopoulos, E. N.; **Diangelakis, N. A.**; Oberdieck, R. “Multi-parametric Optimization and Control”; John Wiley & Sons; 2020.
2. Burnak, B.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “Integrated process design and operational optimization via multi-parametric programming”; Morgan & Claypool Publishers; 2020.
3. **Diangelakis, N. A.** “Model-based multi-parametric programming strategies towards the integration of design, control and operational optimization”. Ph.D. Thesis, Imperial College London, London, United Kingdom, 2017.
4. **Diangelakis, N. A.** “Modelling and Optimisation of a Combined Heat and Power System”. Master’s Thesis, Imperial College London, London, United Kingdom, 2012.
5. **Diangelakis, N. A.** “Design of Hybrid Renewable Energy Systems for Desalination Plants by Reverse Osmosis: Application in the Arid Islands of the Aegean Sea”. Diploma Thesis, National Technical University of Athens, Athens, Greece, 2011.

Peer-reviewed publications

1. Pappas, I.; Kenefake, D.; Burnak, B.; Avraamidou, S.; Ganesh, H. S.; Katz, J.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “Multiparametric Programming in Process Systems Engineering: Recent Developments and Path Forward”, *Frontiers in Chemical Engineering* 2020, *accepted manuscript*
2. Pappas, I.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “Multiparametric/Explicit Nonlinear Model Predictive Control for Quadratically Constrained Problems”, *Journal of Process Control* 2020, *under review*
3. Pappas, I.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “The Exact Solution of Multiparametric Quadratically Constrained Quadratic Programming Problems”, *Journal of Global Optimization* 2020, *published online 25/07/2020*.
4. Burnak, B.; **Diangelakis, N. A.**; Katz, J.; Pistikopoulos, E. N. “Integrated process design, scheduling, and control using multiparametric programming”. *Computers & Chemical Engineering, Special Issue* 2019, 125, 164-184.
5. Jain, P.; **Diangelakis, N. A.**; Mannan, M. S.; Pistikopoulos, E. N. “Process resilience based process upset events prediction analysis: application to a batch reactor case study”. *Journal of Loss Prevention in the Process Industries* 2019, 62, 103957.
6. Burnak, B.; **Diangelakis, N. A.**; Pistikopoulos, E. N., “Towards the grand unification of process design, control, and scheduling - Utopia or reality?”. *Processes* 2019, 7 (7), 461.
7. Ogumerem, G. S.; Kim, C.; Kesisoglou, I.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “A multi-objective optimization for the design and operation of a hydrogen network for transportation fuel”. *Chemical Engineering Research and Design* 2018, 131, 279-292.
8. Burnak, B.; Katz, J.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “Simultaneous Process Scheduling and Control: A Multiparametric Programming Based Approach”. *Industrial & Engineering Chemistry Research* 2018, 57 (11), 3963-3976.
9. Oberdieck, R.; **Diangelakis, N. A.**; Avraamidou, S.; Pistikopoulos, E. N. “On unbounded and binary parameters in multi-parametric programming: Applications to mixed-integer bilevel optimization and duality theory”. *Journal of Global Optimization* 2017, 69 (3), 587-606.

10. Oberdieck, R.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “Explicit Model Predictive Control: A connected-graph approach”. *Automatica* 2017, 76, 103-112.
11. **Diangelakis, N. A.**; Pistikopoulos, E. N. “A multi-scale energy systems engineering approach to residential combined heat and power systems”. *Computers & Chemical Engineering* 2017, 102, 128-138.
12. **Diangelakis, N. A.**; Burnak, B.; Katz, J. P.; Pistikopoulos, E. N. “Process Design and Control optimization: A simultaneous approach by multi-parametric programming”. *AIChE Journal* 2017, 63 (11), 4827-4846.
13. **Diangelakis, N. A.**; Avraamidou, S.; Pistikopoulos, E. N. “Decentralized Multiparametric Model Predictive Control for Domestic Combined Heat and Power Systems”. *Industrial & Engineering Chemistry Research* 2016, 55 (12), 3313-3326.
14. Pistikopoulos, E. N.; **Diangelakis, N. A.** “Towards the integration of process design, control and scheduling: Are we getting closer?”. *Computers & Chemical Engineering* 2016, 91, 85-92.
15. Oberdieck, R.; **Diangelakis, N. A.**; Papathanasiou, M. M.; Nascu, I.; Pistikopoulos, E. N. “POP - Parametric Optimization Toolbox”. *Industrial & Engineering Chemistry Research* 2016, 55 (33), 8979-8991.
16. Oberdieck, R.; **Diangelakis, N. A.**; Nascu, I.; Papathanasiou, M. M.; Sun, M.; Avraamidou, S.; Pistikopoulos, E. N. “On multi-parametric programming and its applications in process systems engineering”. *Chemical Engineering Research and Design* 2016, 116, 61-82.
17. Pistikopoulos, E. N.; **Diangelakis, N. A.**; Oberdieck, R.; Papathanasiou, M. M.; Nascu, I.; Sun, M. “PAROC-An integrated framework and software platform for the optimisation and advanced model-based control of process systems”. *Chemical Engineering Science* 2015, 136, 115-138.
18. **Diangelakis, N. A.**; Panos, C.; Pistikopoulos, E. N. “Design optimization of an internal combustion engine powered CHP system for residential scale application”. *Computational Management Science* 2014, 11 (3), 237-266.

Book chapters

1. **Diangelakis, N. A.**; Oberdieck, R.; Pistikopoulos, E. N. “Explicit (Offline) Optimization for MPC. In *Handbook of Model Predictive Control*”; Rakovic, S., Levine, W., Eds.; Control Engineering; Birkhäuser, Cham, 2019.
2. Ogumerem, G. S.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “Natural Gas based SOFC in Distributed Electricity Generation: Modeling and Control”. In *Natural Gas Processing from Midstream to Downstream*; Elbashir, N. O., El-Halwagi, M. M., Hall, K. R., Economou, I., Eds.; Wiley, 2018.
3. **Diangelakis, N. A.**; Pistikopoulos, E. N. “Modelling, Design and Control Optimization of a Residential Scale CHP System”. In *Advances in Energy Systems Engineering*; Kopanos, G. M., Liu, P., Georgiadis, M. C., Eds.; Springer Berlin Heidelberg, 2017.

Conference publications

1. Pappas, I.; Avraamidou, S.; Katz, J.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “A Multiparametric Programming Based Approach for Multiobjective Model Predictive Control - Application to a Bioreactor System”. 30th European Symposium on Computer-Aided Process Engineering (ESCAPE-30); 2020.
2. Pappas, I.; **Diangelakis, N. A.**; Pistikopoulos, E. N. “A Strategy for the Exact Solution of Multiparametric/Explicit Quadratically Constrained NMPC Problems”. 21st IFAC World Congress; 2020; Accepted Manuscript.

3. Tian, Y.; Pappas, I. S.; Katz, J.; Burnak, B.; Avraamidou, S.; **Diangelakis, N. A.**; Pistikopoulos, E. N. "Towards a systematic framework for the synthesis of operational process intensification systems - Application to reactive distillation systems". 29th European Symposium on Computer-Aided Process Engineering (ESCAPE-29); 2019; pp 73-78.
4. Katz, J.; **Diangelakis, N. A.**; Pistikopoulos, E. N. "Model Approximation in Multiparametric Optimization and Control - A Computational Study". 13th International Symposium on Process Systems Engineering (PSE 2018); Elsevier, 2018; pp 655-660.
5. Burnak, B.; Katz, J.; **Diangelakis, N. A.**; Pistikopoulos, E. N. "Integration of Design, Scheduling, and Control of Combined Heat and Power Systems: A Multiparametric Programming Based Approach". 13th International Symposium on Process Systems Engineering (PSE 2018); Elsevier, 2018; pp 2203-2208.
6. **Diangelakis, N. A.**; Pappas, I. S.; Pistikopoulos, E. N. "On multiparametric/explicit NMPC for Quadratically Constrained Problems". 6th IFAC Conference on Nonlinear Model Predictive Control; Elsevier, 2018; pp 400-405.
7. **Diangelakis, N. A.**; Burnak, B.; Pistikopoulos, E. N. "A multi-parametric programming approach for the simultaneous process scheduling and control - Application to a domestic cogeneration unit". Foundations of Computer Aided Process Operations / Chemical Process Control; 2017.
8. Avraamidou, S.; **Diangelakis, N. A.**; Pistikopoulos, E. N. "Mixed Integer Bilevel Optimization through Multi-parametric Programming". Foundations of Computer Aided Process Operations / Chemical Process Control; 2017.
9. **Diangelakis, N. A.**; Pistikopoulos, E. N. "Model-based multi-parametric programming strategies towards the integration of design, control and operational optimization". 27th European Symposium on Computer-Aided Process Engineering (ESCAPE-27); Elsevier, 2017; pp 1867-1872.
10. Nascu, I.; **Diangelakis, N. A.**; Oberdieck, R.; Papathanasiou, M. M.; Pistikopoulos, E. N. "Explicit MPC in real-world applications: The PAROC framework". American Control Conference (ACC); 2016; pp 913-918.
11. **Diangelakis, N. A.**; Pistikopoulos, E. N. A Decentralised "Multi-parametric Model Predictive Control Study for a Domestic Heat and Power Cogeneration System". 12th International Symposium on Process Systems Engineering and 25th European Symposium on Computer Aided Process Engineering; Elsevier, 2015; Computer Aided Chemical Engineering 37 pp 1499-1504.
12. Pistikopoulos, E. N.; **Diangelakis, N. A.**; Manthanwar, A. M. "Towards the integration of process design, control and scheduling: Are we getting closer?". 12th International Symposium on Process Systems Engineering and 25th European Symposium on Computer Aided Process Engineering; Elsevier, 2015; Computer Aided Chemical Engineering 37 pp 41-48.
13. **Diangelakis, N. A.**; Manthanwar, A. M.; Pistikopoulos, E. N. "A framework for design and control optimisation. Application on a CHP system". Proceedings of the 8th International Conference on Foundations of Computer-Aided Process Design; Elsevier, 2014; Computer Aided Chemical Engineering 34 pp 765-770.

Conference presentations

American Institute of Chemical Engineering

Pittsburgh, Pennsylvania, USA

Oral Presentation

2018

Tilte: Robust Explicit Optimization and Control within the PAROC Framework

6th IFAC Conference on Nonlinear Model Predictive Control

Madison, Wisconsin, USA

Poster Presentation

2018

Tilte: On multiparametric/explicit NMPC for Quadratically Constrained Problems

American Institute of Chemical Engineering

Minneapolis, Minnesota, USA

Poster Presentation

2017

Tilte: A Multi-Parametric Bi-Level Optimization Strategy for Hierarchical Model Predictive Control

FOCAPO / CPC Tucson, Arizona, USA
Poster Presentation 2017
 Title: A multi-parametric programming approach for the simultaneous process scheduling and control - Application to a domestic cogeneration unit

ESCAPE27 Barcelona, Spain
Oral Presentation 2017
 Title: Model-based multi-parametric programming strategies towards the integration of design, control and operational optimization

Texas A&M Conference on Energy College Station, Texas, USA
Oral Presentation 2016
 Title: Design, Operations and Control of Distributed Energy Systems

American Institute of Chemical Engineering Salt Lake City, Utah, USA
Oral Presentations 2015
 Title: Simultaneous Design, Control and Operational Optimisation of a Domestic CHP System
 Title: PAROC - a Unified Framework Towards the Optimal Design, Operational Operation and Model-Based Control of Process Systems

BFG Conference on Optimisation London, United Kingdom
Oral Presentation 2015
 Title: A computational comparison of solution strategies for the explicit MPC of a CHP power generation system
Session Chair
 Session: Control Theory

PSE2015/ESCAPE25 Copenhagen, Denmark
Oral Presentation 2015
 Title: A Decentralised Multi-parametric Model Predictive Control Study for a Domestic Heat and Power Cogeneration System

American Institute of Chemical Engineering San Francisco, California, USA
Oral Presentation 2013
 Title: Modelling and Explicit Model Predictive Control for Combined Heat and Power System (CHP)