

Christos T. Maravelias

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EDUCATION

2004	CARNEGIE MELLON UNIVERSITY PhD in Chemical Engineering	PITTSBURGH, PA
1997	LONDON SCHOOL OF ECONOMICS M.Sc. in Operational Research	LONDON, UK
1996	NATIONAL TECHNICAL UNIVERSITY OF ATHENS Diploma in Chemical Engineering	ATHENS, GREECE

PROFESSIONAL EXPERIENCE

09/20 – date	PRINCETON UNIVERSITY Chair, Department of Chemical and Biological Engineering Director of Graduate Studies, Chemical and Biological Engineering Anderson Family Professor in Energy and the Environment Professor of Chemical and Biological Engineering	PRINCETON, NJ 7/2022 – 7/2021 – 6/2022 9/2020 – 9/2020 –
08/04 – 08/20	UNIVERSITY OF WISCONSIN Department of Chemical and Biological Engineering Executive Officer Professor Associate Professor Assistant Professor	MADISON, WI 11/2015 – 06/2018 09/2014 – 08/2020 09/2010 – 08/2014 08/2004 – 08/2010
01/98 – 07/99	GREEK ARMY TELECOMMUNICATIONS DEVISION National defense telecommunication network (“HERMES”) supervisor	ATHENS, GREECE

SELECT AWARDS AND HONORS

Anderson Family Professor in Energy and the Environment	2020-date
Paul E. Elfers Professor, University of Wisconsin – Madison	2017-2020
<i>Production and Operations Management Society Applied Research Challenge Award</i>	2016
2016 <i>Covestro Lecture</i> , Department of Chemical Engineering, Carnegie Mellon University	2016
2014 Best Paper Award, <i>Computes and Chemical Engineering</i>	2015
Vilas Distinguished Achievement Professor, University of Wisconsin – Madison	2015-2020
2013 Outstanding Young Researcher Award – CAST Division of AIChE	2013
2012 Best Paper Award, <i>Computes and Chemical Engineering</i>	2013
Vilas Associate, University of Wisconsin – Madison	2013-2015
2008 W. David Smith Jr. Graduate Student Paper Award – CAST Division of AIChE	2008
National Science Foundation CAREER Award	2006-2011
Inaugural Olaf A. Hougen Fellowship	2004-2007
Carnegie Mellon University Graduate Fellowship	1999-2004
Alexander S. Onassis Public Benefit Foundation Graduate Fellowship	1999-2001
Fulbright Graduate Fellowship (declined)	1999

SELECT PROFESSIONAL ACTIVITIES**1. LEADERSHIP POSITIONS:**

- *Great Lakes Bioenergy Research Center*: Team Lead, 12/2017 – 11/202
- *Great Lakes Bioenergy Research Center*: Management Team Member, 12/2017 – date.
- *Computing and Systems Technology (CAST) division of the American Institute of Chemical Engineers (AIChE)*: Director, 2011-14; 2nd Vice-chair, 2017; 1st Vice-chair; 2018; Chair, 2019.

2. JOURNAL SERVICE:

- *Computers and Chemical Engineering*, Editorial Advisory Board, 2017 – date.
- *AIChE Journal*, Consulting Editors Board, 2017 – date.
- *Energy Technology*, International Advisory Board member, 2017 – date.

3. CONFERENCE ORGANIZATION:

- *Foundations of Computer-aided Process Operations 2017*: Chair.
- *Pan American Advanced Studies: Process Modeling and Optimization for Energy and Sustainability*, 2011: Chair.

4. PROPOSAL REVIEWER:

US Department of Energy; US National Science Foundation; American Chemical Society; National Sciences and Engineering Research Council of Canada; Hellenic Ministry of Education; Dutch Technology Foundation STW; Swiss National Science Foundation; The Royal Society.

5. SHORT COURSES:

- *Optimization for Process and Energy Systems Operations*, Seoul National University, S. Korea, January 18 – 22, **2021**.
- *Optimization Methods for Chemical Process Operations*, KAIST, S. Korea, May 14, **2019**.
- *Optimization Methods*, Johnson Controls, Inc., Milwaukee, WI, August 19, **2016**.
- *Mixed-integer programming methods for supply chain optimization*. Pan American Advanced Studies Institute 2011. Angra dos Reis, RJ, Brazil, July 19-29, **2011**.
- *Mixed-integer programming methods for scheduling and production planning*. Department of Chemical Engineering, Texas A&M University, College Station, TX, May 20-22, **2008**.

RESEARCH MENTORING

Former MS Students (University of Wisconsin – Madison): Brandon Paul (2020).

Former MS Students (Princeton University): Bianca Dyer (2022).

Former PhD Students (University of Wisconsin – Madison): Charles Sung (2009), Matthew Colvin (2010), Arul Sundaramoorthy (2011), Carlos Henao (2012), Kaushik Subramanian (2012), Patricia Nason (2013), Sara Velez (2014), Murat Sen (2014), Andres Merchan (2016), Yachao Dong (2017), Michael Risbeck (2018), Wenzhao Wu (2018), Dhruv Gupta (2019), Lingxun Kong (2019), Ho Jae Lee (2019), Xinyue Peng (2019), Yifu Chen (2021), Venkatachalam Avadiappan (2021), Yaqing Wu (2021), Joonjae Ryu (2022).

Current Graduate Students (University of Wisconsin - Madison): Arthur Pastore.

Current Graduate Students (Princeton University): Eric O'Neil, Garry Taifan, Caleb Geissler, Bianca Dyer, Molly McDonald, Amin Samadi, Kathy Wang, Nathan Barrett, Nathan Tran, Harshit Verma.

Former Postdoctoral Scholars: Pradeep Prasad (2005-06), Jiyong Kim (2009-13), Jeehoon Han (2012-14), Srinivas Rangarajan (2013-16), Jeff Herron (2013-15), Kirti Yenkie (2015-17), Bruno Calfa (2015-17), Wangyun Won (2015-17), Rex Ng (2015-18), Kefeng Huang (2015-19), Gautham M. Ramapriya (2016-18), Payman Fasahati (2017-19), Shamik Misra (2019-21), Ishan Bajaj (2019-22), Juan M Restrepo Florez (2019-22), Jaewon Byun (2021-22).

Current Postdoctoral Scholars: Boeun Kim, Jianping Li, Robert E.F. Junior, Yingkai Song.

Current Research Scholar: Nathan Adelgren.

TEACHING

University of Wisconsin – Madison

- Senior-level *Process Design*
- Senior-level *Process Dynamics and Control*
- Graduate core course *Intermediate Problems in Chemical Engineering*
- Graduate elective course *Advanced Chemical Process Synthesis and Optimization*

Princeton University

- Senior-level required *Process Design, Synthesis and Optimization of Chemical Processes*
- Senior-level elective *Introduction to Energy Systems Engineering*
- Graduate elective *Advanced Optimization Methods for Energy Systems Engineering*

PUBLICATIONS - SUMARRY

- 1 book - monograph
- 185 journal papers
- 6 book chapters
- 52 papers in conference proceedings (peer reviewed)
- 12 workshop presentations
- 43 plenary, keynote and invited conference presentations
- 86 invited lecture and seminars

BOOK

Maravelias CT. *Chemical Production Scheduling: Mixed-Integer Programming Models and Methods*. (Cambridge Series in Chemical Engineering). Cambridge University Press, Cambridge, **2021**.

RECENT JOURNAL PAPERS (2019-22)

- [1] Restrepo-Florez JM, Cuello-Penalzoza P, Canales E, Witkowski D, Rothamer D, Hubber GW, Maravelias CT. Ethanol to Diesel: A Sustainable Alternative for the Heavy-Duty Transportation Sector, *Sustainable Energy & Fuels*, accepted.
- [2] Kim S, Dale EB, Martinez-Feria R, Basso B, Thelen K, Maravelias CT, Landis DA, Lark T, Robertson GP. Global Warming Intensity of Biofuel Derived from Switchgrass Grown on Marginal Land in Michigan, *GCB Bioenergy*, accepted (DOI: 10.1111/gcbb.13024).
- [3] Taifan GSP, Maravelias CT. Integrated Membrane Material Design and System Synthesis. *Chemical Engineering Science*, accepted (DOI: 10.1016/j.ces.2022.118406).
- [4] Kim B, Maravelias CT. Supervised Machine Learning for Understanding and Improving Computational Performance of Chemical Production Scheduling MIP Models. *Industrial & Engineering Chemistry Research*, 61 (46), 17124-171636, **2022**.
- [5] Avadiappan V, Gupta D, Maravelias CT. Production Scheduling Under Uncertainty in the Presence of Feedback: Model Comparisons, Insights, and Paradoxes. *Computers & Chemical Engineering*, 168, 108028, **2022**.
- [6] Restrepo-Florez JM, Ryu J, Rothamer D, Maravelias CT. A Systems-Level Analysis of Ethanol Upgrading to Middle Distillates, *Energy & Environmental Science*, 15, 4376-4388, **2022**.
- [7] Chen Y, Maravelias CT. Variable Bound Tightening and Valid Constraints for Multiperiod Blending. *INFORMS Journal on Computing*, 34 (4), 2073-2090, **2022**.
- [8] Bachman E, Tavasoli A, Hatton TA, Maravelias CT, Haites E, Styring P, Aspuru-Guzik, A, MacIntosh J, Ozin G. Rail-based Direct Air Carbon Capture, *Joule*, 6(7), 1368-1389, **2022**.
- [9] Chen Y, Maravelias CT. Tightening Methods Based on Nontrivial Bounds on Bilinear Terms, *Optimization and Engineering*, 23, 1217-1254, **2022**.

- [10] Misra S, Buttazoni LR, Avadiappan V, Lee H, Yang M, Maravelias CT. CPros: A Web-Based Application for Chemical Production Scheduling. *Computers and Chemical Engineering*, 164, 107895, **2022**.
- [11] Li J, Maravelias CT, Van Lehn RC. Adaptive Conformer Sampling for Property Prediction Using Conductor-like Screening Model for Real Solvents. *Ind. & Eng. Chem Res.*, 61, 9025-9036, **2022**.
- [12] Geissler CH, Maravelias CT. Analysis of Alternative Bioenergy with Carbon Capture Strategies: Present and Future. *Energy & Environmental Science*, 15, 2679-2689, **2022**.
- [13] Ryu J, Maravelias CT. On the Derivation of Graphically-Inspired Feasibility Constraints for Distillation Network Synthesis. *AIChE Journal*, 68(7), e17740, **2022**.
- [14] Perez JM, Umana GE, Sener C, Misra S, Coplien J, Haak D, Li Y, Maravelias CT, Karlen SD, Ralph J, Donohue TJ, Noguera DR. Integrating Lignin Depolymerization with Microbial Funneling Processes Using Agronomically Relevant Feedstocks. *Green Chemistry*, 24, 2795-2811, **2022**.
- [15] Neuro SMS, Pinto JM, Maravelias CT. Integrated Production and Distribution Planning for Industrial Gases Supply Chains. *Computers & Chemical Engineering*, 161, 107778, **2022**.
- [16] Yu L, Seabright K, Bajaj I, Keffer DJ, Alonso DM, Hsieh C, Li M, Chen H, Dai S, Gandomi YA, Maravelias CT, Harper DP. Performance and Economic Analysis of Organosolv Softwood and Herbaceous Lignins to Activated Carbons as Electrode Materials in Supercapacitors. *Frontiers in Energy Research – Bioenergy and Biofuels*, 10, 849949, **2022**.
- [17] Pastore AE, Maravelias CT. A Generalized Framework for Reactor Network Synthesis: A Graph Theoretic Approach. *Computers & Chemical Engineering*, 160, 107722, **2022**.
- [18] Taifan GSP, Maravelias CT. Generalized Optimization-based Synthesis of Membrane Systems for Multicomponent Gas Mixture Separation. *Chemical Engineering Science*, 252, 117482, **2022**.
- [19] O'Neill EG, Martinez-Feria RA, Basso B, Maravelias CT. Integrated Spatially Explicit Landscape and Cellulosic Biofuel Supply Chain Optimization Under Biomass Yield Uncertainty. *Computers & Chemical Engineering*, 160, 107724, **2022**.
- [20] Liu X, Shen Z, Peng X, Tian L, Hao R, Wang L, Xu Y, Liu Y, Maravelias CT, Li W, Ozin GA. A Photo-assisted Electrochemical-based Demonstrator for Green Ammonia Synthesis. *Journal of Energy Chemistry*, 68, 826-834, **2022**.
- [21] McAllister RD, Rawlings JB, Maravelias CT. The Inherent Robustness of Closed Loop Scheduling. *Computers & Chemical Engineering*, 159, 107678, **2022**.
- [22] Huang K, Peng X, Kong L, Wu W, Chen Y, Maravelias CT. Greenhouse Gas Emission Mitigation Potential of Chemicals Produced from Biomass. *ACS Sustainable Chemistry & Engineering*, 9, 14480-14487, **2021**.
- [23] Peng X, Bajaj I, Yao M, Maravelias CT. Solid-gas Thermochemical Energy Storage Strategies for Concentrating Solar Power: Optimization and System Analysis. *Energy Conversion and Management*, 245, 114636, **2021**.
- [24] Geissler HC, Maravelias CT. Economic, Energetic, and Environmental Analysis of Carbon Capture in Lignocellulosic Biorefineries. *Applied Energy*, 302, 117539, **2021**.
- [25] Wu Y, Maravelias CT. A General Framework and Optimization Models for the Scheduling of Continuous Chemical Processes. *AIChE Journal*, 67 (10), e17344, **2021**.
- [26] Ryu J, Maravelias CT. Generalized Distillation Network Synthesis. *Chemical Engineering Science*, 243, 116766, **2021**.
- [27] Dong Y, Maravelias CT. Terminal Inventory Level Constraints for Online Production Scheduling. *European Journal of Operational Research*, 295, 102-117, **2021**.
- [28] Chang H, Bajaj I, Matagamwala AH, Somasundaram A, Huber GW, Maravelias CT, Dumesic JA. Sustainable Production of 5-Hydroxymethyl Furfural from Glucose for Process Integration with High Fructose Corn Syrup Infrastructure. *Green Chemistry*, 23, 3277-3288, **2021**.
- [29] Adjiman CS, Sahinidis NV, Vlachos DG, Bakshi B, Maravelias CT, Georgakis C. Process Systems Engineering Perspective on the Design of Materials and Molecules. *Industrial & Engineering Chemistry Research*, 60, 5194-5206, **2021**.

- [30] Restrepo-Florez JM, Maravelias CT. Advanced Fuels from Ethanol - A Superstructure-based Optimization Approach. *Energy & Environmental Science*, 493-506, 14, **2021**.
- [31] Avadiappan V, Maravelias CT. State Estimation in Online Batch Production Scheduling: Concepts, Definitions, Algorithms, and Optimization Models, *Computers & Chemical Engineering*, 146, 107209, **2021**.
- [32] O'Neill EG, Maravelias CT. Towards Integrated Landscape Design and Biofuel Supply Chain Optimization. *Current Opinion in Chemical Engineering*, 31, 100666, **2021**.
- [33] Wu Y, Maravelias CT, Wenzel MJ, ElBsat MN, Turney RT. Predictive Maintenance Scheduling Optimization in Heating, Ventilation and Air Conditioning Systems. *Energy & Buildings*, 231, 110487, **2021**.
- [34] Taifan G, Maravelias CT. Integration of Graphical Approaches into Optimization-Based Design of Multistage Liquid Extraction. *Computers & Chemical Engineering*, 143, 107126, **2020**.
- [35] Ryu J, Maravelias CT. Efficient Generalized Shortcut Distillation Model with Improved Accuracy for Superstructure-based Process Synthesis. *AIChE J.*, 66 (11), e16994, **2020**.
- [36] Ryu J, Maravelias CT. Computationally Efficient Optimization Models for Preliminary Distillation Column Design and Separation Energy Targeting. *Computers & Chemical Engineering*, 143, 107072, **2020**.
- [37] Kim S, Zhang X, Reddy AD, Dale BE, Thelen KD, Jones CD, Izaurrealde RC, Runge T, Maravelias CT. Carbon-Negative Biofuel Production, *Environmental Science & Technology*, 54, 10797-10807, **2020**.
- [38] Chang H, Bajaj I, Huber GW, Maravelias CT, Dumesic JA. Catalytic Strategy for Conversion of Fructose to Organic Dyes, Polymers, and Liquid Fuels. *Green Chemistry*, 5285-5295, 22, **2020**.
- [39] Kong L, Maravelias CT. On the Derivation of Piecewise Linear Approximating Functions. *INFORMS Journal on Computing*, 32 (3), 531-546, **2020**.
- [40] Chen Y, Maravelias CT. Preprocessing Algorithm and Tightening Constraints for Multiperiod Blend Scheduling: Cost Minimization. *Journal of Global Optimization*, 603-625, 77, **2020**.
- [41] Risbeck MJ, Maravelias CT, Rawlings JB, Turney RD. Mixed-integer Optimization Methods for Online Scheduling in Large-scale HVAC Systems. *Optimization Letters*, 889-924, 14, **2020**.
- [42] Lee H, Maravelias CT. Combining the Advantages of Discrete- and Continuous-time Scheduling Models. Part 3: General Algorithm. *Computers & Chemical Engineering*, 106848, 139, **2020**.
- [43] Karlen SD et al. Assessing the Viability of Recovering Hydroxycinnamic Acids from Lignocellulosic Biorefinery Alkaline Pretreatment Waste Streams. *ChemSusChem*, 13, 2012-2024, **2020**.
- [44] Huang K, Maravelias CT. Synthesis and Analysis of Nonoxidative Methane Aromatization Strategies. *Energy Technology*, 1900650, **2020**.
- [45] Lee H, Gupta D, Maravelias CT. Systematic Generation of Alternative Production Schedules. *AIChE J.*, 66, e16926, **2020**.
- [46] Bhandari S, Rangarajan S, Maravelias CT, Dumesic JA, Mavrikakis M. Reaction Mechanism of Vapor-phase Formic Acid Decomposition over Platinum Catalysts: DFT, Reaction Kinetics Experiments, and Microkinetic Modeling. *ACS Catalysis*, 10, 4112-4126, **2020**.
- [47] Lindsay MJ, Huang K, Buchinger BA, Maravelias CT, Dumesic JA, Rankin SA, Huber GW. Catalytic Production of Glucose-Galactose Syrup from Greek Yogurt Acid Whey in a Continuous Flow Reactor. *Chem Sus Chem*, 13, 791-802, **2020**.
- [48] Peng X, Yao M, Root TW, Maravelias CT. Design and Analysis of Concentrated Solar Power Plants with Fixed-bed Reactors for Thermochemical Energy Storage. *Applied Energy*, 262, 114543, **2020**.
- [49] Gupta D, Maravelias CT. Framework for Studying Online Production Scheduling Under Endogenous Uncertainty. *Computers & Chemical Engineering*, 135, 106670, **2020**.

- [50] McAllister RD, Rawlings JB, Maravelias CT. Rescheduling Penalties for Economic Model Predictive Control and Closed-loop Scheduling. *Industrial & Engineering Chemistry Research*, 59, 2214-2228, **2020**.
- [51] Wu Y, Maravelias CT. A General Model for Periodic Chemical Production Scheduling. *Industrial & Engineering Chemistry Research*, 59, 2505-2515, **2020**.
- [52] Kong L, Maravelias CT. Generalized Short-Cut Distillation Column Modeling for Superstructure-based Process Synthesis. *AIChE J.*, 66 (2), e16809, **2020**.
- [53] Huang K, Fasahati P, Maravelias CT. System-level Analysis of Lignin Valorization in Lignocellulosic Biorefineries. *iScience*, 23 (1), 100751, **2020**.
- [54] Ryu J, Kong L, Pastore de Lima, Maravelias CT. A Generalized Superstructure-based Framework for Process Synthesis. *Computers & Chemical Engineering*, 133, 106653, **2020**.
- [55] Kong L, Maravelias CT. Expanding the Scope of Distillation Network Synthesis Using Superstructure-based Methods. *Computers & Chemical Engineering*, 133, 106650, **2020**.
- [56] Wu W, Yenkie KM, Maravelias CT. Synthesis and Analysis of Separation Processes for Extracellular Chemicals Generated from Microbial Conversions. *BMC Chemical Engineering*, 1, 21, **2019**.
- [57] Kong L, Maravelias CT. From Graphical to Model-based Distillation Design: a McCabe-Thiele-inspired Mathematical Program. *AIChE J.*, 65, e16731, **2019**.
- [58] Risbeck MJ, Maravelias CT, Rawlings JB. Unification of Closed-loop Scheduling and Control: State-space Formulations, Terminal Constraints, and Theoretical Properties. *Computers & Chemical Engineering*, 129, 106496, **2019**.
- [59] Gupta D, Maravelias CT. On the Design of Online Production Scheduling Algorithms. *Computers & Chemical Engineering*, 129, 106517, **2019**.
- [60] Fasahati P, Wu W, Maravelias CT. Process Synthesis and Economic Analysis of Cyanobacterial Biorefineries: A Superstructure-based Approach, *Applied Energy*, 253, 113625, **2019**.
- [61] Lee H, Maravelias CT. Combining the Advantages of Discrete- and Continuous-time Scheduling Models. Part 2: Systematic Methods for Determining Model Parameters. *Computers and Chemical Engineering*, 128, 557-573, **2019**.
- [62] Motagamwala AH, Huang K, Maravelias CT, Dumesic JA. Solvent System for Effective Near-term Production of Hydroxymethylfurfural (HMF) with Potential for Long-term Process Improvement. *Energy & Environmental Science*, 2212-2222, 12, **2019**.
- [63] Rawlings BC, Avadiappan V, Lafortune S, Maravelias CT, Wassick JM. Incorporating Automation Logic in Online Chemical Production Scheduling. *Computers & Chemical Engineering*, 128, 201-215, **2019**.
- [64] Peng X, Root TW, Maravelias CT. Optimization-based Process Synthesis under Seasonal and Daily Variability: Application on Concentrating Solar Power Plants. *AIChE Journal*, 65 (7), **2019**.
- [65] Rawlings JB, Maravelias CT. Bringing New Technologies and Approaches to the Operation and Control of Chemical Process Systems. *AIChE J.*, 65 (6), e16615, **2019**.
- [66] Wu W, Maravelias CT. Identifying the Characteristics of Promising Renewable Replacement Chemicals. *iScience*, 15, 136-146, **2019**.
- [67] Tountas AA, Peng X, Tavasoli AV, Duchesne PN, Dingle TL, Dong Y, Hurtado L, Mohan A, Sun W, Ulmer U, Wang L, Wood TE, Maravelias CT, Sain MM, Ozin GA. Towards Solar Methanol: Past, Present and Future, *Advanced Science*, 6, 1801903, **2019**.
- [68] Ryu J, Maravelias CT. Simultaneous Process and Heat Exchanger Network Synthesis Using a Discrete Temperature Grid. *Industrial & Engineering Chemistry Research*, 58, 6002-6016, **2019**.
- [69] Ng RTL, Fasahati P, Huang K, Maravelias CT. Utilizing Stillage in the Biorefinery: Economic, Technological, and Energetic Analysis. *Applied Energy*, 241, 491-503, **2019**.