

GREGORY P. THIEL

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EDUCATION

Massachusetts Institute of Technology – Cambridge, Massachusetts

Ph.D. in Mechanical Engineering (GPA: 4.8/5.0)

June 2015

Major Field: Energy Science and Engineering, Minor Field: Finance

Thesis: Desalination Systems for the Treatment of Hypersaline Produced Water from Unconventional Oil and Gas Processes

Massachusetts Institute of Technology – Cambridge, Massachusetts

S.M. in Mechanical Engineering (concentration: Thermodynamics, Heat and Mass Transfer, GPA: 4.9/5.0)

June 2012

Thesis: Entropy Generation Minimization in a Heat and Mass Exchanger for Use in a Humidification-Dehumidification Desalination System

Case Western Reserve University – Cleveland, Ohio

B.S.E., *summa cum laude* in Mechanical Engineering (GPA: 3.98/4.00)

May 2010

EXPERIENCE

Massachusetts Institute of Technology – Cambridge, Massachusetts

Postdoctoral Associate and Shapiro Teaching Fellow

June 2015 – December 2016

- Co-authored a book chapter, 4 journal publications, and 3 conference papers on fundamental thermodynamics, thermal systems, and desalination
- Proposed, received, and managed a grant for a \$243k waste-to-resource industrial research project

Lead Instructor – Advanced Heat and Mass Transfer

January 2016 – June 2016

- Lectured, wrote exams, and led a team of three co-instructors to teach analysis of conduction, convection, radiation, and mass transfer
- Received an overall rating of 6.5/7 by students on subject evaluations with highest marks for ‘displaying thorough knowledge of subject material’

Graduate Research Assistant

September 2010 – June 2015

- Co-authored 10 journal publications and 3 conference papers in the areas of energy efficient desalination, thermochemical analysis of wastewater, fundamental thermodynamics, and heat and mass transfer

Teaching Assistant – Desalination and Water Purification

January 2013 – June 2013

- Aided students’ learning of desalination systems and water chemistry by developing homework problems and providing one-on-one help

Teaching Assistant – Advanced Heat and Mass Transfer

January 2012 – June 2012

- Led review sessions to reinforce course material and participated in the design and grading of homework sets and exam questions
- Received an overall rating of 6.3/7 by students on subject evaluations, with high marks for encouraging participation and the students’ individual role in learning

GE Oil & Gas – Houston, Texas

Engineering Intern – High-Speed Reciprocating Compressors

June 2010 – August 2010

- Ensured quality and consistency in compressor documentation by reviewing general assembly drawings of compressor components to be distributed on a technical documentation website for customer use
- Developed a tool in Microsoft Access VBA to size lubrication divider blocks based on a customer’s desired compressor options

GE Transportation – Erie, Pennsylvania

Summer Intern & Part Time Co-Op – Off Highway Vehicles/Wind Inventory Specialist

May 2009 – June 2010

- Increased unit productivity through the development of inventory and production management tools using Visual Basic and Microsoft Access
- Improved manufacturing process efficiency and on-time performance by participating in a Lean manufacturing project to develop standard work and a kanban system for wheel sub-assemblies

NASA Glenn Research Center – Cleveland, Ohio

Research Assistant

January 2009 – May 2009

- Developed a correlation to predict elasticity characteristics of a foil type journal bearing through static load-deflection testing

GE Transportation – Erie, Pennsylvania

Engineering Intern – Locomotive Platform Engineering

June 2008 – August 2008

- Led and participated in various locomotive platform cost-out projects totaling more than \$15k in savings over the fiscal year
- Led mechanical integration enhancements involving new product introduction on new export locomotive design; area of focus was the locomotive platform and its interface with other subsystems
- Authored a technical design guide on walkway construction fundamentals and design allowables

CWRU Musculoskeletal Mechanics and Materials Lab – Cleveland, Ohio

Research Assistant

October 2007 – May 2008

- Assisted in the development of a damage parameter to indicate bone failure by creating stress-strain curves in MATLAB using data obtained from human femur bone samples
- Compared the vibrational effects on surrounding tissue of the grinding of two dental implants by assisting in experimentally simulating the grinding operation

JOURNAL PUBLICATIONS

Y. Roy, **G. P. Thiel**, M. A. Antar and J. H. Lienhard V, "The Effect of Increased Top Brine Temperature on the Performance and Design of OT-MSF Using a Case Study", *Desalination*, Feb. 2017, Accepted.

B. A. Qureshi, S.M. Zubair, **G. P. Thiel** and J. H. Lienhard V, "The reversed chemical engine cycle with application to desalination processes", *Desalination*, 398: 256–264, Nov. 2016.

G. P. Thiel and J. H. Lienhard V, "An effectiveness–number of transfer units relationship for evaporators with non-negligible boiling point elevation increases", *Journal of Heat Transfer*, 138(12): 121801–121801-8, Dec. 2016.

W. Rohlf, **G. P. Thiel [joint first author]**, and J. H. Lienhard V, "Modeling reverse osmosis element design using superposition and an analogy to convective heat transfer", *Journal of Membrane Science*, 512: 38–49, Aug. 2016.

G. P. Thiel, "Salty solutions," *Physics Today*, 68(6): 66, Jun. 2015.

G. P. Thiel, E. W. Tow, L. D. Banchik, H. Chung, and J. H. Lienhard V, "Energy consumption in desalinating produced water from shale oil and gas extraction," *Desalination*, 366: 94–112, Jun. 2015.

G. P. Thiel, S. M. Zubair, and J. H. Lienhard V, "An analysis of likely scalants in the treatment of produced water from Nova Scotia," *Heat Transfer Engineering*, 36(7–8): 652–662, 2015.

G. P. Thiel and J. H. Lienhard V, "Treating produced water from hydraulic fracturing: composition effects on scale formation and desalination system selection," *Desalination*, 346: 54–69, Aug. 2014.

G. P. Thiel, R. K. McGovern, S. M. Zubair, and J. H. Lienhard V, "Thermodynamic equipartition for increased second law efficiency," *Applied Energy*, 118: 292–299, Apr. 2014.

G. P. Thiel, J. A. Miller, S. M. Zubair, and J. H. Lienhard V, "Effect of mass extractions and injections on the performance of a fixed-size humidification-dehumidification desalination system," *Desalination*, 314: 50–58, Apr. 2013.

G. P. Narayan, K. Chehayeb, R. K. McGovern, **G. P. Thiel**, S. M. Zubair, and J. H. Lienhard V, "Thermodynamic balancing of the humidification dehumidification desalination system by mass extraction and injection," *International Journal of Heat and Mass Transfer*, 57(2): 756–770, Feb. 2013.

R. K. McGovern, **G. P. Thiel**, G. P. Narayan, S. M. Zubair, and J. H. Lienhard V, "Performance Limits of Zero and Single Extraction Humidification Dehumidification Desalination Systems," *Applied Energy*, 102: 1081–1090, Feb. 2013.

G. P. Thiel and J. H. Lienhard V, "Entropy generation in condensation in the presence of high concentrations of noncondensable gases," *International Journal of Heat and Mass Transfer*, 55(19-20): 5133–5147, Sep. 2012.

K. H. Mistry, R. K. McGovern, **G. P. Thiel**, E. K. Summers, S. M. Zubair, and J. H. Lienhard V, "Entropy generation analysis of desalination technologies," *Entropy*, 13(10): 1829–1864, Sep. 2011. **Received Entropy Best Paper Award, 2015.**

BOOK CHAPTERS AND REPORTS

J. H. Lienhard V, **G. P. Thiel**, D. E. M. Warsinger, L. D. Banchik (eds.), "Low Carbon Desalination: Status and Research, Development, and Demonstration Needs, Report of a workshop conducted at the Massachusetts Institute of Technology in association with the Global Clean Water Desalination Alliance," MIT Abdul Latif Jameel World Water and Food Security Lab, Cambridge, MA, November 2016.

J. H. Lienhard V, K. H. Mistry, M. H. Sharqawy, **G. P. Thiel**, "Thermodynamics, Exergy, and Energy Efficiency in Desalination Systems," in *Desalination Sustainability: A Technical, Socioeconomic, and Environmental Approach*, Ch. 5, H. A. Arafat, Ed., Elsevier, 2016. In press.

CONFERENCE PAPERS

J. H. Lienhard V, **G. P. Thiel**, W. Rohlf, "Making desalination an energy efficient alternative," Proceedings of the First Pacific Rim Thermal Engineering Conference, 13–17 Mar. 2016.

G. P. Thiel, L. D. Banchik, and J. H. Lienhard V, "Hybridization of humidification-dehumidification and pressure retarded osmosis for brine concentration applications," IDA World Congress, San Diego, USA, 30 Aug. to 4 Sep. 2015.

K. G. Nayar, N. C. Wright, **G. P. Thiel**, A. G. Winter V, and J. H. Lienhard V, "Energy requirements of alternative technologies for desalinating groundwater for irrigation," IDA World Congress, San Diego, USA, 30 Aug. to 4 Sep. 2015.

G. P. Thiel, S. M. Zubair, and J. H. Lienhard V, "An analysis of likely scalants in the treatment of produced water from Nova Scotia," Heat Exchanger Fouling and Cleaning X, Budapest, Hungary, 9–14 Jun. 2013.

G. P. Narayan, K. Chehayeb, R. K. McGovern, **G. P. Thiel**, S. M. Zubair, and J. H. Lienhard V, "Continuous extraction in an infinitely large humidification-dehumidification desalination system for attaining complete thermodynamic reversibility in water production," EDS Conference on Desalination for the Environment, Barcelona, Spain, 22–26 Apr. 2012.

G. P. Narayan, R. K. McGovern, **G. P. Thiel**, J. A. Miller, M. H. Sharqawy, S. M. Zubair, M. A. Antar, and J. H. Lienhard V, "Status of humidification-dehumidification desalination," IDA World Congress on Desalination and Water Reuse, Perth, Australia, 5–9 Sep. 2011. **Received Best Paper Award.**

PATENTS

G. P. Narayan, G. P. Thiel, R. K. McGovern, J. H. Lienhard V, and M. H. El-Sharqawy, "Humidification-Dehumidification System with a Bubble-Column Vapor Mixture Condenser and Intermediate Gas Extraction," U. S. Patent 9,320,984, 26 Apr. 2016.

G. P. Narayan, G. P. Thiel, R. K. McGovern, J. H. Lienhard V, and M. H. El-Sharqawy, "Bubble-Column Vapor Mixture Condenser," U. S. Patent 9,072,984, 7 Jul. 2015.

G. P. Narayan, G. P. Thiel, R. K. McGovern, J. H. Lienhard V, and M. H. El-Sharqawy, "Humidification-Dehumidification System Including a Bubble-Column Vapor Mixture Condenser," U. S. Patent 8,778,065, 15 Jul. 2014.

G. P. Narayan, G. P. Thiel, R. K. McGovern, J. H. Lienhard V, and M. H. El-Sharqawy, "Bubble-Column Vapor Mixture Condenser," U. S. Patent 8,523,985, 3 Sep. 2013.

G. P. Narayan, G. P. Thiel, R. K. McGovern, J. H. Lienhard V, S. K. Das, K. M. Chehayeb, S. M. Zubair, M. A. Antar, "Thermodynamic Balancing of Combined Heat and Mass Exchange Devices," U. S. Patent 8,496,234, 30 July 2013.

AWARDS

Shapiro Teaching Fellow (MIT, 2016)

MIT Martin Family Fellow for Sustainability (2012–2013)

Eni-MIT Energy Initiative Fellowship (2010–2011)

The Gustav Kuerti Award (CWRU, 2010)

The Robert and Leona Garwin Award (CWRU, 2009)

The Max Kade Excellence In German Award (CWRU, 2009)

LANGUAGES

German – Conversationally proficient

Spanish and Mandarin Chinese – Speak, read, and write with basic competency

PROFESSIONAL MEMBERSHIPS, SERVICE, AND LEADERSHIP ACTIVITIES

Organizing Committee, MIT Low-Carbon Desalination Workshop (2016)

Global Founders Skills Accelerator, MIT (2015)

MIT Water Night Logistics Director, MIT Water Club (2015)

MIT Water Summit Panel Lead, MIT Water Club (2014)

Environment, Health, and Safety Representative, Rohsenow-Kendall Heat and Mass Transfer Lab (MIT, 2013–Present)

Graduate Association of Mechanical Engineers, Treasurer (MIT, 2012–2013)

German Club (CWRU, 2009–2010)

International Desalination Association (2012–2015)

American Society of Mechanical Engineers (2006–Present)

Ohio State Board of Professional Engineers and Surveyors, Engineer Intern (2010–Present)

Tau Beta Pi (2009–Present)