

Laura A. Schaefer

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EDUCATION

Georgia Institute of Technology, Atlanta, Georgia.

Ph.D. in Mechanical Engineering, August 2000.

M.S. in Mechanical Engineering, December 1997.

Ph.D. Dissertation: Single Pressure Absorption Heat Pump Analysis.

M.S. Thesis: Heat Exchanger Mean Temperature Differences for Refrigerant Mixtures.

Advisor: Dr. Samuel V. Shelton.

Minor: Operations Research (Optimization).

Rice University, Houston, Texas.

B.S. in Mechanical Engineering, May 1995.

B.A. in English, May 1995.

ACADEMIC POSITIONS

Burton J. and Ann McMurtry Chaired Professor, July 2015 - Present.

Department of Mechanical Engineering, Rice University, Houston, Texas.

Professor, September 2013 - June 2015.

Associate Professor, August 2006 - August 2013.

Assistant Professor, August 2000 - July 2006.

Bicentennial Board of Visitors Faculty Fellow, September 2005 - June 2015.

Mechanical Engineering and Materials Science Department, University of Pittsburgh, Pittsburgh, Pennsylvania.

Visiting Researcher, September 2011 - June 2012.

Energy Futures Laboratory, Imperial College, London, UK.

Graduate Research Assistant, September 1998 - August 2000.

NSF Graduate Research Fellow, September 1995 - August 1998.

Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia.

ACADEMIC LEADERSHIP EXPERIENCE

Department Chair, July 2015 - Present.

Department of Mechanical Engineering, Rice University, Houston, Texas.

Associate Director, January 2008 - May 2015.

Center for Energy, University of Pittsburgh, Pittsburgh, Pennsylvania.

Deputy Director, September 2006 - June 2015.

Mascaro Center for Sustainable Innovation, University of Pittsburgh, Pittsburgh, Pennsylvania.

HONORS AND AWARDS

Fellow, American Society of Mechanical Engineers, 2011.

Bicentennial Board of Visitors Faculty Fellow, School of Engineering, University of Pittsburgh, 2005 - 2015.

CAREER Award, National Science Foundation, Chemical and Transport Systems, 2003.

New Investigator Award, American Society of Heating, Refrigerating, & Air-Conditioning Engineers, 2002.

Faculty Honor Roll, School of Engineering, University of Pittsburgh, 2002.

Faculty for the Future Startup Fellowship (Faculty Coupon), General Electric Foundation, 2000.

Life Member's Scholarship, Georgia Engineering Foundation, 1999 - 2000.

Graduate Teaching Fellowship, American Society of Mechanical Engineers, 1998 - 2000.

Best Paper, Thermodynamic Analysis of Energy Systems, Advanced Energy Systems Division, ASME, 1999.

Graduate Grant-In-Aid, ASHRAE, 1998.

Graduate Research Fellowship, National Science Foundation, 1995 - 98.

Sylvia Farny Scholarship, American Society of Mechanical Engineers, 1994 - 95.

RESEARCH OVERVIEW

My research area is the analysis, design and optimization of energy systems. My energy systems research relies on a solid basis of computational thermal/fluids modeling and to date has focused on topics such as:

- fluid and heat transfer properties of two-phase binary zeotropic flow in microchannels,
- cogeneration system heat and mass transfer modeling,
- the multiphase, multicomponent lattice Boltzmann method,
- increased efficiency in energy conversion and utilization, and
- design and characterization of thermoacoustic Stirling engines.

This research has received over \$12 million in funding by organizations such as NSF, AFOSR, ASHRAE, DOE, and NCIIA.

JOURNAL PAPERS

1. Perdue, D.[†], Chen, L.[‡], and **Schaefer, L.**, 2020, "Exergetic Relationship Between the Thermal Properties of Direct Contact Membrane Distillation," *ASME Journal of Heat Transfer*, HT-19-1220, in press.
2. Agbim, K.A.[†], and **Schaefer, L.**, 2020, "Investigation of Thermoresponsive Microgel Polymer Swelling Theory," *Polymer Reviews*, in press (available online), <https://doi.org/10.1080/15583724.2019.1711392>.
3. Rao, P.[‡], and **Schaefer, L.**, 2019, "Lattice Boltzmann models for micro-tomographic pore-spaces," *Computers and Fluids*, vol. 193, p. 104294, doi: 10.1016/j.compfluid.2019.104294.
4. Fernandes, M.[†], and **Schaefer, L.**, 2019, "Long-term environmental impacts of a small-scale spectral filtering concentrated photovoltaic-thermal system," *Energy Conversion and Management*, vol. 184, pp. 350-361, doi: 10.1016/j.enconman.2019.01.026.

[†] Graduate Student

[‡] Post-Doctoral Researcher/Research Scientist

5. Chen, L.[‡], and **Schaefer, L.**, 2018, "Gudunov-type upwind flux schemes of the two-dimensional finite volume discrete Boltzmann method," *Computers & Mathematics with Applications*, vol. 75, no. 9, pp. 3105-3126, <https://doi.org/10.1016/j.camwa.2018.01.034>.
6. Whiston, M.[†], Collinge, W.O., Bilec, M.M., and **Schaefer, L.**, 2017, "Exergy and economic comparison between kW-scale hybrid and stand-alone solid oxide fuel cell systems," *Journal of Power Sources*, vol. 353, pp. 152-166; doi: <https://doi.org/10.1016/j.jpowsour.2017.03.113>.
7. Xu, L.[†], Rao, P.[‡], and **Schaefer, L.**, 2016, "A novel scheme for curved moving boundaries in the lattice Boltzmann method," *International Journal of Modern Physics C*, vol. 27, no. 12, p. 1650144, doi: 10.1142/S0129183116501448.
8. Collinge, W.O.[‡], DeBlois, J.C.[†], Landis, A.E., **Schaefer, L.A.**, and Bilec, M.M., 2016, "A hybrid dynamic-empirical building energy modeling approach for an existing campus building," *ASCE Journal of Architectural Engineering*, p. 04015010, doi: 10.1061/(ASCE)AE.1943-5568.0000183.
9. Xu, H., Li, Y., Collinge, W.O.[‡], **Schaefer, L.A.**, Landis, A.E., Bilec, M.M., and Jones, A.K., 2016, "Towards a commodity solution for the internet of things," *Computers & Electrical Engineering*, vol. 52, pp. 138-156, <http://dx.doi.org/10.1016/j.compeleceng.2016.03.009>.
10. Whiston, M.W.[†], Bilec, M.M., and **Schaefer, L.**, 2015, "Influence of the charge double layer on solid oxide fuel cell stack behavior," *Journal of Power Sources*, vol. 293, pp. 767-777, doi: 10.1016/j.jpowsour.2015.05.085.
11. Whiston, M.W.[†], Bilec, M.M., and **Schaefer, L.**, 2015, "SOFC stack model for integration into a hybrid system," *ASME Journal of Fuel Cell Science and Technology*, vol. 12, no. 3, p. 031006, doi: 10.1115/1.4029877.
12. Tourkov, K.[†], and **Schaefer, L.**, 2015, "Performance evaluation of a PVT/ORC system with optimization of the ORC and evaluation of several PV materials," *Energy*, vol. 82, pp. 839-849, doi: 10.1016/j.energy.2015.01.094.
13. Tourkov, K.[†], and **Schaefer, L.**, 2015, "Effect of Regenerator Positioning on Thermoacoustic Effect in a Looped Tube Traveling Wave Thermoacoustic Engine," *Energy Conversion and Management*, vol. 95, pp. 94-100, doi: 10.1016/j.enconman.2015.02.027.
14. Chen, L.[†], and **Schaefer, L.**, 2015, "A unified and preserved Dirichlet boundary treatment for the cell-centered finite volume discrete Boltzmann method," *Physics of Fluids*, vol. 27, p. 027104, doi: 10.1063/1.4907782.
15. Olinzock, M.A.[†], Landis, A.E., Saunders, C.L.[†], Collinge, W.O.[‡], Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2015, "Life cycle assessment use in the North American building community: summary of findings from a 2011/2012 survey," *The International Journal of Life Cycle Assessment*, vol. 20, pp. 318-331, doi: 10.1007/s11367-014-0834-y.
16. Rao, P.R.[†], and **Schaefer, L.**, 2015, "Numerical Stability of Explicit Off-Lattice Boltzmann Schemes: A Comparative Study," *Journal of Computational Physics*, vol. 285, pp. 251-264, doi: 10.1016/j.jcp.2015.01.017.

17. Tourkov, K.[†], Zink, F.[†], and **Schaefer, L.**, 2015, "Thermoacoustic Sound Generation Under the Influence of Resonator Curvature," *International Journal of Thermal Sciences*, vol. 88, pp. 158-163, doi: 10.1016/j.ijthermalsci.2014.09.016.
18. Collinge, W.O.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2014, "Productivity Metrics in Dynamic LCA for Whole Buildings: Using a Post-Occupancy Evaluation of Energy and Indoor Environmental Quality Tradeoffs," *Building and Environment*, vol. 82, pp. 339-348, doi: 10.1016/j.buildenv.2014.08.032.
19. Ikeda, M.K.[†], Rao, P.R.[†], and **Schaefer, L.A.**, 2014, "A Thermal Multicomponent Lattice Boltzmann Model," *Computers and Fluids*, vol. 101, pp. 250-262, doi: 10.1016/j.compfluid.2014.06.006.
20. Kimber, M., Clark, W.W., and **Schaefer, L.**, 2014, "Conceptual Analysis and Design of a Partitioned Multifunctional Smart Insulation," *Applied Energy*, vol. 114, pp. 310-319, doi: 10.1016/j.apenergy.2013.09.067.
21. Saunders, C.L.[†], Landis, A.E., Mecca, L.P., Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2013, "Analyzing the Practice of Life Cycle Assessment: Focus on the Building Sector," *Journal of Industrial Ecology*, vol. 17, no. 5, pp. 777-788, doi: 10.1111/jiec.12028.
22. Thiel, C.L.[†], Champion, N.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, Bilec, M.M., 2013, "A Materials Life Cycle Assessment of a Net-Zero Energy Building," *Energies*, vol. 6, pp. 1125-1141, doi: 10.3390/en6021125.
23. Kim, G., **Schaefer, L.**, Lim, T.S., and Kim, J.T., 2013, "Thermal Comfort Prediction of an Underfloor Air Distribution System in a Large Indoor Environment," *Energy and Buildings*, vol. 64, pp. 323-331, doi: 10.1016/j.enbuild.2013.05.003.
24. DeBlois, J.[†], Bilec, M., and **Schaefer, L.**, 2013, "Simulating Home Cooling Load Reductions for a Novel Opaque Roof Solar Chimney Configuration," *Applied Energy*, vol. 112, pp. 142-151, doi: 10.1016/j.apenergy.2013.05.084.
25. Collinge, W.O.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, Bilec, M.M., 2013, "Indoor Environmental Quality in a Dynamic Life Cycle Assessment Framework for Whole Buildings: Focus on Human Health Chemical Impacts," *Building and Environment*, vol. 62, pp. 182-190, doi: 10.1016/j.buildenv.2013.01.015.
26. Bao, J.[†], and **Schaefer, L.**, 2013, "Lattice Boltzmann Equation Model for Multi-Component Multi-Phase Flow with High Density Ratios," *Journal of Applied Mathematical Modelling*, vol. 37, no. 4, doi:10.1016/j.apm.2012.04.048.
27. DeBlois, J.[†], Bilec, M., and **Schaefer, L.**, 2013, "Design and Zonal Building Information Modeling of a Roof Integrated Solar Chimney," *Renewable Energy*, vol. 52, pp. 241-250, doi:10.1016/j.renene.2012.10.023.
28. Kim, G., Lim, H.S., **Schaefer, L.**, and Kim, J.T., 2013, "Overall Environmental Modelling of Newly Designed Curtain Wall Façade Configurations," *Indoor and Built Environment*, vol. 22, no. 1, pp. 168-179, doi:10.1177/1420326X12470281.

29. Kim, G., **Schaefer, L.**, and Kim, J.T., 2013, "Development of a Double-Skin Façade for Sustainable Renovation of Old Residential Buildings," *Indoor and Built Environment*, vol. 22, no. 1, pp. 180-190, doi:10.1177/1420326X12469533.
30. Collinge, W.O.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2013, "Dynamic Life Cycle Assessment: Framework and Application to an Institutional Building," *International Journal of Life Cycle Assessment*, vol. 18, no. 3, pp. 538-552, doi:10.1007/s11367-012-0528-2.
31. Kerzmann, T.[†], and **Schaefer, L.**, 2013, "Flowrate Optimization of a Linear Concentrating Photovoltaic System," *Journal of Solar Energy Engineering*, vol. 135, no. 2, doi: 10.1115/1.4023006.
32. Kerzmann, T.[†], and **Schaefer, L.**, 2012, "System Simulation of a Linear Concentrating Photovoltaic System with an Active Cooling System," *Renewable Energy*, vol. 41, pp. 254-261, doi:10.1016/j.renene.2011.11.004.
33. Kim, G., Kim, H.S., Lim, T.S., **Schaefer, L.**, and Kim, J.T., 2012, "Comparative Advantage of an Exterior Shading Device in Thermal Performance for Residential Buildings," *Energy and Buildings*, vol. 46, pp. 105-111, doi:10.1016/j.enbuild.2011.10.040.
34. Lim, T.S., **Schaefer, L.**, Kim, J.T., and Kim, G., 2011, "Energy Benefit of the Underfloor Air Distribution System for Reducing Air-Conditioning and Heating Loads in Buildings," *Indoor and Built Environment*, vol. 21, no. 1, pp. 62-70, doi:10.1177/1420326X11419345.
35. Ikeda, M.[†], and **Schaefer, L.A.**, 2011, "Examining the Effect of Binary Interaction Parameters on VLE Modelling using Cubic Equations of State," *Fluid Phase Equilibria*, vol. 305, no. 2, pp. 233-237, doi: 10.1016/j.fluid.2011.03.029.
36. Trapp, A.[†], Zink, F.[†], Prokopyev, O., and **Schaefer, L.**, 2011, "Thermoacoustic Heat Engine Modeling and Optimization," *Applied Thermal Engineering*, vol. 31, nos. 14-15, pp. 2518-2528, doi: 10.1016/j.applthermaleng.2011.04.017.
37. Miller, V.[†], Landis, A.E., and **Schaefer, L.A.**, 2011, "A Benchmark for Life Cycle Air Emission and Life Cycle Impact Assessment of Hydrokinetic Energy Extraction Using Life Cycle Assessment," *Renewable Energy*, vol. 36, no. 3, pp. 1040-1046., doi: 10.1016/j.renene.2010.08.016.
38. Miller, V.[†], Ramde, E., Gradoville, R. Jr., and **Schaefer, L.**, 2011, "Hydrokinetic Power for Energy Access in Rural Ghana," *Renewable Energy*, vol. 36, no. 2, pp. 671-675, doi: 10.1016/j.renene.2010.08.014.
39. Miller, V.[†], and **Schaefer, L.**, 2010, "Dynamic Modeling of Hydrokinetic Energy Extraction," *Journal of Fluids Engineering*, vol. 132, no. 9, article 091102, doi: 10.1115/1.4002431.
40. Zink, F.[†], Vipperman, J., and **Schaefer, L.**, 2010, "CFD Simulation of Thermoacoustic Cooling," *International Journal of Heat and Mass Transfer*, vol. 53, nos. 19-20, pp. 3940-3946, doi: 10.1016/j.ijheatmasstransfer.2010.05.012
41. Zink, F.[†], Vipperman, J., and **Schaefer, L.**, 2010, "CFD Simulation of a Thermoacoustic Engine with Coiled Resonator," *International Communications in Heat and Mass Transfer*, vol. 37, no. 3, pp. 226-229, doi: 10.1016/j.icheatmasstransfer.2009.09.001.

42. Zink, F.[†], Vipperman, J., and **Schaefer, L.**, 2010, "Environmental Motivation to Switch to Thermoacoustic Refrigeration," *Applied Thermal Engineering*, vol. 30, nos. 2-3, pp. 119-126, doi: 10.1016/j.applthermaleng.2009.07.008.
43. Zink, F.[†], Waterer, H., Archer, R., and **Schaefer, L.**, 2009, "Geometric Optimization of a Thermoacoustic Stack," *International Journal of Thermal Sciences*, vol. 48, no. 12, pp. 2309-2322, doi: 10.1016/j.ijthermalsci.2009.05.007.
44. Bao, J.[†], Yuan, P.[†], and **Schaefer, L.**, 2008, "A Mass Conserving Boundary Condition for the Lattice Boltzmann Method," *Journal of Computational Physics*, vol. 227, no. 18, pp. 8472-8487, doi: 10.1016/j.jcp.2008.06.003.
45. Maina, J. Y.[†], Mickle, M. H., Lovell, M. R., and **Schaefer, L. A.**, 2008, "Complex Radio Frequency (RF) Communications with Virtual Pulses," *Computers and Electrical Engineering*, vol. 34, no. 5, pp. 423-437, doi: 10.1016/j.compeleceng.2007.09.005.
46. Li, P.-W.[‡], **Schaefer, L.**, and Chyu, M. K., 2007, "Three-Dimensional Model for the Conjugate Heat and Gas Species Transport in a Planar Type Solid Oxide Fuel Cell," *International Journal of Transport Phenomena*, vol. 9, no. 1, pp. 1-18.
47. Maina, J. Y.[†], Mickle, M. H., Lovell, M. R., and **Schaefer, L.**, 2007, "Application of CDMA for Anticollision and Increase Read Efficiency of Multiple RFID Tags," *Journal of Manufacturing Systems*, vol. 26, no. 1, pp. 37-43, doi: 10.1016/j.jmsys.2007.05.001.
48. Zink, F.[†], Lu, Y.[†], and **Schaefer, L.**, 2007, "A Solid Oxide Fuel Cell System For Buildings," *Energy Conversion and Management*, vol. 48, no. 3, pp. 809-818, doi: 10.1016/j.enconman.2006.09.010.
49. Lu, Y.[†], and **Schaefer, L.**, 2006, "Numerical Study of a Flat-Tube High Power Density Solid Oxide Fuel Cell: Part II. Cell Performance and Stack Optimization," *Journal of Power Sources*, vol. 153, no. 1, pp. 68-75, doi: 10.1016/j.jpowsour.2005.03.189.
50. Yuan, P.[†], and **Schaefer, L.**, 2006, "Equations of State in a Lattice Boltzmann Model," *Physics of Fluids*, vol. 18, no. 4, article 042101, doi: 10.1063/1.2187070.
51. Yuan, P.[†], and **Schaefer, L.**, 2006, "A Thermal Lattice Boltzmann Two-Phase Flow Model and its Application to Heat Transfer Problems - Part 2. Integration and Validation," *ASME Journal of Fluids Engineering*, vol. 128, no. 1, pp. 151-156, doi: 10.1115/1.2137344.
52. Yuan, P.[†], and **Schaefer, L.**, 2006, "A Thermal Lattice Boltzmann Two-Phase Flow Model and its Application to Heat Transfer Problems - Part 1. Theoretical Foundation," *ASME Journal of Fluids Engineering*, vol. 128, no. 1, pp. 142-150, doi: 10.1115/1.2137343.
53. Lu, Y.[†], **Schaefer, L.**, and Li, P.-W.[‡], 2005, "Numerical Simulation of Heat Transfer and Fluid Flow of a Flat-Tube Type High Power Density Solid Oxide Fuel Cell," *ASME Journal of Fuel Cell Science and Technology*, vol. 2, no. 1, pp. 65-69, doi: 10.1115/1.1843120.
54. Lu, Y.[†], **Schaefer, L.**, and Li, P.-W.[‡], 2005, "Numerical Study of a Flat-Tube High Power Density Solid Oxide Fuel Cell: Part I. Heat/Mass Transfer and Fluid Flow," *Journal of Power Sources*, vol. 140, no. 2, pp. 331-339, doi: 10.1016/j.jpowsour.2004.08.036.

55. Li, P.-W.[‡], **Schaefer, L.**, and Chyu, M. K., 2004, “A Numerical Model Coupling the Heat and Gas Species’ Multiple Transport Processes in a Tubular SOFC,” *ASME Journal of Heat Transfer*, vol. 126, no. 2, pp. 219-229, doi: 10.1115/1.1667528.
56. Lu, Y.[†], and **Schaefer, L.**, 2004, “A SOFC System Fed with Hydrogen Sulfide and Natural Gas,” *Journal of Power Sources*, vol. 135, pp. 184-191, doi: 10.1016/j.jpowsour.2004.04.012.
57. **Schaefer, L. A.**, and Schaefer, A. J., 2004, “Locating Hybrid Fuel Cell-Turbine Power Generation Under Uncertainty,” *Annals of Operations Research*, vol. 132, pp. 301-322, doi: 10.1023/b:anor.0000045288.72359.de.
58. Li, P.-W.[‡], **Schaefer, L.**, Wang, Q.-M., Zhang, T.[†], and Chyu, M. K., 2003, “Multi-gas Transportation and Electrochemical Performance of a Polymer Electrolyte Fuel Cell with Complex Flow Channels,” *Journal of Power Sources*, vol. 115, no. 1, pp. 90-100, doi: 10.1016/s0378-7753(02)00723-1.
59. Li, P.-W.[‡], Zhang, T.[†], Wang, Q.-M., **Schaefer, L.**, and Chyu, M. K., 2003, “The Performance of PEM Fuel Cells Fed with Oxygen through the Free-convection Mode,” *Journal of Power Sources*, vol. 114, pp. 63-69, doi: 10.1016/s0378-7753(02)00535-9.
60. Cain, J. T., Clark, W. C., **Schaefer, L. A.**, Mandrecki, W., Ulinski, D.[†], and Mickle, M. H., 2001, “Energy Harvesting for DNA Gene Sifting and Sorting,” *International Journal of Parallel and Distributed Systems and Networks*, Special Issue on Energy Harvesting, vol. 4, no. 3, pp. 140-149.
61. **Schaefer, L. A.**, 1997, “Foundations of the State Principle,” *Journal of Energy Resources Technology*, Vol. 119, pp. 205-207, doi: 10.1115/1.2794991.

BOOK CHAPTERS

1. **Schaefer, L.**, 2015, “Microrotorcraft,” in *Encyclopedia of Micro- and Nanofluidics*, D. Li, ed., Springer, pp. 2140-2149.
2. **Schaefer, L.**, 2008, “Microrotorcraft,” in *Encyclopedia of Micro- and Nanofluidics*, D. Li, ed., Springer.
3. Li, P.-W.[‡], **Schaefer, L.**, and Chyu, M. K., 2005, “Multiple Transport Processes in Solid Oxide Fuel Cells,” Chapter 1 in *Transport Phenomena in Fuel Cells*, B. Sunden and M. Fahgri, eds., Southampton: Wit Press.
4. Shelton, S. V., and **Schaefer, L. A.**, 1999, “The Economic Payoff for Global Warming Emissions Reduction,” in *Greenhouse Gas Control Technologies*, B. Eliasson et al., eds., Amsterdam: Pergamon Press, pp. 1151-53.

REFEREED CONFERENCE PROCEEDINGS

1. Chen, L.[‡], Sadat, H., and **Schaefer, L.**, 2019, “A multi-relaxation-time finite volume discrete Boltzmann method for viscous flows,” *ASME-JSME-KSME 2019 8th Joint Fluids Engineering Conference*.

2. Chen, L.[‡], **Schaefer, L.**, and Cai, X., 2018, “An Accurate Unstructured Finite Volume Discrete Boltzmann Method,” *ASME 2018 International Mechanical Engineering Congress and Exposition*.
3. Xu, H.[†], Li, Y.[†], Collinge, W.O.[‡], **Schaefer, L.A.**, Bilec, M.M., Jones, A.K., and Landis, A.E., 2016, “Improving efficiency of wireless sensor networks through lightweight in-memory compression,” *Sixth International Green Computing Conference and Sustainable Computing Conference*, IEEE, 1-8.
4. Xu, H.[†], Bilec, M.M., Collinge, W.O.[‡], **Schaefer, L.A.**, Landis, A.E., and Jones, A.K., 2015, “Lynx: a self-organizing wireless sensor network with commodity palmtop computers,” *ACM/IEEE International Workshop on System Level Interconnect Prediction (SLIP)*, 1-7.
5. Collinge, W.O.[‡], DeBlois, J.C.[†], Sweriduk, M.E.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2015, “Measuring whole-building performance with dynamic LCA: a case study of a green university building,” *International Symposium on Life Cycle Assessment and Construction – Civil engineering and buildings*, pp. 309-317 (+4 pages of appendices).
6. DeBlois, J.C.[†], Collinge, W.O.[‡], Bilec, M.M., and **Schaefer, L.A.**, 2015, “Calibration and Modeling for a Dashboard that Provides Real-Time Feedback on Energy Saving Strategies,” *Building Simulation Conference*, Hyderabad, India, BS-2150.
7. Whiston, M.W.[†], Collinge, W.O.[‡], Bilec, M.M., and **Schaefer, L.A.**, 2014, “Dynamic Response of a Solid Oxide Fuel Cell Stack to Changes in a University Building’s Load,” *ASME, International Mechanical Engineering Congress and Exposition*, IMECE2014-39206.
8. DeBlois, J.C.[†], Collinge, W.O.[‡], Bilec, M.M., Jones, A.K., and **Schaefer, L.A.**, 2014, “Modeling a Multi-Purpose Public Building with Stochastic Gains and Occupancy Schedules,” *ASHRAE Winter Meeting*, New York, NY, 12093.
9. Jones, A., Chen, Y.[†], Collinge, W.O.[‡], Xu, H.[†], **Schaefer, L.**, Landis, A., and Bilec, M., 2013, “Considering Fabrication in Sustainable Computing,” *International Conference on Computer-Aided Design*, San Jose, CA, 6691120, pp. 206-210.
10. Jones, A.K., Liao, L.[†], Collinge, W.O.[‡], Xu, H.[†], **Schaefer, L.A.**, Landis, A.E., and Bilec, M.M., 2013, “Green Computing: A Life Cycle Perspective,” *International Green Computing Conference*, Arlington, VA.
11. Xu, H.[†], Bilec, M., **Schaefer, L.**, Landis, A., and Jones, A., 2013, “Ocelot: A Wireless Sensor Network and Computing Engine with Commodity Palmtop Computers,” *International Green Computing Conference*, Arlington, VA.
12. Collinge, W.O.[‡], DeBlois, J.C.[†], Sweriduk, M.E., Landis, A.E., Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2012, “Measuring Whole-Building Performance with Dynamic LCA: A Case Study of a Green University Building,” *International Symposium on Life Cycle Assessment and Construction*, Nantes, France, R12095.
13. Collinge, W.[‡], Landis, A., Jones, A.K., **Schaefer, L.**, and Bilec, M., 2012, “Integrating Indoor Environmental Quality Metrics in a Dynamic Life Cycle Assessment Framework For Buildings,” *Proceedings of the 2012 IEEE International Symposium on Sustainable Systems & Technology (ISSST)*, Boston, MA, doi: 10.1109/ISSST.2012.6227992.

14. Ikeda, M.[†], and **Schaefer, L.**, 2012, “Lattice Boltzmann Simulation of Thermal Multiphase Flows with Dynamic Wall Interactions,” ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2012-87405.
15. Saunders, C.L.[†], Landis, A., Jones, A.K., **Schaefer, L.**, and Bilec, M., 2012, “Utilizing Measured Energy Usage to Analyze Design Phase Energy Models,” *Proceedings of the 2012 IEEE International Symposium on Sustainable Systems & Technology (ISSST)*, Boston, MA, doi: 10.1109/ISSST.2012.6227982.
16. **Schaefer, L.**, Ikeda, M.[†], and Bao, J.[†], 2012, “The Lattice Boltzmann Equation Method for Complex Flows,” ASME, *10th International Conference on Nanochannels, Microchannels and Minichannels*, ICNMM2012-73049, Keynote Presentation.
17. Hu, Y.[†], and **Schaefer, L.**, 2011, “Detailed Energy and Exergy Analysis for Lithium Bromide Absorption Chiller and a Conventional Electric Chiller (R134a),” ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2011-64266.
18. Ikeda, M.[†], and **Schaefer, L.**, 2011, “Lattice Boltzmann Simulation of a Vapor Bubble in a Microchannel undergoing Flow Boiling,” ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2011-66044.
19. Knotts, W.[†], Miller, D.[†], Mo, C.[‡], **Schaefer, L.A.**, and Clark, W.W., 2011, “Smart Insulation for Thermal Control in Buildings,” ASME, *Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, SMASIS2011-5007.
20. Collinge, W., Bilec, M., Landis, A., Jones, A., and **Schaefer, L.**, 2011, “Scenario Modeling for Dynamic Life Cycle Assessment of Commercial and Institutional Buildings,” *Proceedings of LCA-XI*, Chicago, IL.
21. Hu, Y.[†], **Schaefer, L.**, and Hartkopf, V., 2011, “Life Cycle Energy and Exergy Analysis for Building Cooling Systems - A Comparison Between a Solar Driven Absorption Chiller and Electric Driven Chiller,” ASME, *International Conference on Energy Sustainability*, ESFuelCell2011-54737.
22. Hu, Y.[†], **Schaefer, L.**, and Hartkopf, V., 2011, “Energy and Exergy Analysis of Integrating compound parabolic collectors (CPC) with Lithium Bromide (Li-Br) Absorption Chiller for Building Heating and Cooling to Achieve Net Zero Buildings,” ASHRAE, *2011 Annual Conference*, Montreal, Quebec, ML-11-C022.
23. Hu, Y.[†], **Schaefer, L.**, and Hartkopf, V., 2011, “Energy and Exergy Analysis of Double Effect (Parallel and Series Flow) Absorption Chiller Systems,” *10th IEA Heat Pump Conference*, Tokyo, Japan (conference changed to virtual conference due to earthquake).
24. Ryan, T.[†], **Schaefer, L.**, and Vipperman, J., 2010, “Control of a Standing-Wave Thermoacoustic Refrigerator,” ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2010-38966.
25. Kerzmann, T.L.[†], and **Schaefer, L.A.**, 2010, “An Energy Analysis of a Linear Concentrating Photovoltaic System with an Active Cooling System,” *SPIE Optics + Photonics*, San Diego, CA.

26. Miller, V.[†], and **Schaefer, L.**, 2009, "Hydrokinetic Turbine Selection and System Characterization," ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2009-11115.
27. Zink, F.[†], Vipperman, J., and **Schaefer, L.**, 2009, "Influence of the thermal properties of the driving components on the performance of a thermoacoustic engine," ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2009-11325.
28. Zink, F.[†], Vipperman, J., and **Schaefer, L.**, 2009, "Heat Transfer Analysis in Thermoacoustic Regenerators using CFD," ASME, *Summer Heat Transfer Conference*, SHTC-88215.
29. Miller, V.[†], and **Schaefer, L.**, 2008, "Dynamic Modeling of Hydrokinetic Energy Extraction," Sustainable Energy Systems, ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2008-67722.
30. Zink, F.[†], Vipperman, J., and **Schaefer, L.**, 2008, "Advancing Thermoacoustics Through CFD Simulation Using Fluent," Applications of Micro and Nanotechnologies to Energy Systems I, ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2008-66510.
31. Li, P.-W.[‡], **Schaefer, L.**, and Chyu, M. K., 2005, "Optimization of Heat/Mass Transfer and Electric Charge Conduction in Solid Oxide Fuel Cells," *5th International Symposium on Multiphase Flow, Heat Mass Transfer and Energy Conversion*, Xi'an, China, pp. 254-260.
32. **Schaefer, L.**, and Shelton, S., 2005, "Working Fluid Selection Through Parameter Estimation," *International Sorption Heat Pump Conference*, Denver, Colorado.
33. Yuan, P.[†], and **Schaefer, L.**, 2004, "Lattice Boltzmann Simulation of Two-phase Flow and Heat Transfer in a Rectangular Channel," Fluids Engineering Division, ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2004-59437.
34. Lu, Y.[†], **Schaefer, L.**, and Li, P.-W.[‡], 2004, "Numerical Simulation of Heat Transfer and Fluid Flow of a Flat-Tube High Power Density Solid Oxide Fuel Cell," *Second International Conference on Fuel Cell Science, Engineering and Technology*, Rochester, New York.
35. Desai, S.[†], Lovell, M., Sacre, M., **Schaefer, L.**, and Mickle, M., 2003, "Development of the RAPID Network," *NCIIA 7th Annual Conference*, Boston, MA, March, 2003.
36. Li, P.-W.[‡], **Schaefer, L.**, and Chyu, M. K., 2003, "The Energy Budget in Tubular and Planar Type Solid Oxide Fuel Cells," Heat Transfer Division, ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2003-42426.
37. Li, P.-W.[‡], **Schaefer, L.**, and Chyu, M. K., 2003, "Interdigitated Heat/Mass Transfer and Chemical/Electrochemical Reactions in a Planar Type Solid Oxide Fuel Cell," *ASME Summer Heat Transfer Conference*, Las Vegas, HT2003-47436.
38. Li, P.-W.[‡], **Schaefer, L.**, and Chyu, M. K., 2003, "Investigation of the Energy Budget in an Internal Reforming Tubular Type Solid Oxide Fuel Cell Through Numerical Computation," *International Joint Power Generation Conference*, Atlanta, IJPGC2003-40126.
39. Li, P.-W.[‡], **Schaefer, L.**, and Chyu, M. K., 2003, "Three-Dimensional Model for the Conjugate Processes of Heat and Gas Species Transportation in a Flat Plate Solid Oxide Fuel Cell," *International Symposium of Transport Phenomenon*, Bali, Indonesia, June 6-9, pp. 305-312.

40. Mickle, M., Lovell, M., **Schaefer, L.**, Wang, A., and Cain, J.T., 2003, "Three Dimensional Sensing for Environment and Security Control," *IEEE International Conference on Systems, Man and Cybernetics, Transactions*.
41. Zhang, T.[†], Li, P.-W.[‡], Wang, Q.-M., **Schaefer, L.**, and Chyu, M. K., 2003, "Fabrication and Performance Evaluation of Miniaturized Proton Exchange Membrane Fuel Cells," *Fuel Cell Science, Engineering and Technology*, Rochester, FUELCELL2003-1709.
42. Li, P.-W.[‡], **Schaefer, L.**, Wang, Q. M., Zhang, T.[†], and Chyu, M. K., 2002, "Multi-gas Transportation and Electrochemical Performance in a Polymer Electrolyte Fuel Cell with Complicated Flow Channels," *First International Symposium on Thermal Science and Technology (TSE 2002)*, Beijing, China, Oct. 23-26, pp. G438-G449.
43. Li, P.-W.[‡], **Schaefer, L.**, Wang, Q.-M., and Chyu, M. K., 2002, "Computation of the Conjugating Heat Transfer of Fuel and Oxidant Separated by a Heat-Generating Cell Tube in a Solid Oxide Fuel Cell," Heat Transfer Division, ASME, *International Mechanical Engineering Congress and Exposition, IMECE2002-32564*.
44. **Schaefer, L. A.**, and Schaefer, A. J., 2001, "The Viability and Reliability of Hybrid Fuel Cell-Turbine Power Generation," *Proceedings of the 2001 Virginia Tech College of Engineering Green Engineering Conference*, M. Gregg, ed., Roanoke, Virginia, CD Transactions, S6-T-03.
45. **Schaefer, L. A.**, and Shelton, S. V., 2001, "Electric and Gas Water Heating: Environmental and Economic Implications," *Proceedings of the 2001 Virginia Tech College of Engineering Green Engineering Conference*, M. Gregg, ed., Roanoke, Virginia, CD Transactions, S2-M-04.
46. Shelton, S. V., Delano, A., and **Schaefer, L. A.**, 1999, "Design Analysis of the Einstein Refrigeration Cycle," *Proceedings, Renewable & Advanced Energy Systems for the 21st Century*, CD Transactions, RAES-04.
47. Shelton, S. V., Delano, A., and **Schaefer, L. A.**, 1999, "Second Law Study of the Einstein Refrigeration Cycle," *Proceedings, Renewable & Advanced Energy Systems for the 21st Century*, CD Transactions, SLA-02.
48. Shelton, S. V., Jacob, D., and **Schaefer, L. A.**, 1999, "Analysis of the Air Cooled Ammonia-Water Triple Effect Cycle," *Proceedings of the ASME Advanced Energy Systems Division*, vol. 39, S. Aceves et al., ed., 151-158.
49. Shelton, S. V., Vodenicker, J., and **Schaefer, L. A.**, 1999, "Three Dimensional Graphic Analysis of Absorption Cycles," *Proceedings of the ASME Advanced Energy Systems Division*, vol. 39, S. Aceves et al., ed., 143-150.
50. **Schaefer, L. A.**, and Shelton, S. V., 1998, "Heat Exchanger Mean Temperature Differences for Refrigerant Mixtures," *Proceedings of the ASME Advanced Energy Systems Division*, vol. 38, H. Metghalchi et al., ed., 383-389.

PRESENTATIONS AND OTHER CONFERENCE PROCEEDINGS

1. **Schaefer, L.**, 2019, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Mechanical Engineering Department, CU-Boulder*.

2. **Schaefer, L.**, 2019, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Mechanical Engineering Department, Texas A&M*.
3. **Schaefer, L.**, 2019, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Sustainable City Laboratory, Hong Kong PolyU*.
4. **Schaefer, L.**, 2019, "Lattice Boltzmann Approaches to Multiphase Flow and Phase Change," *Simulation and Modeling of Phase Change Processes, Micro and Nanoscale Phase Change Heat Transfer Gordon Research Conference*.
5. **Schaefer, L.**, 2019, "Mentorship Component: Career Paths and Differences Between Academia, Industry and Government," panel member, *From Physical Understanding to Application Enhancement of Phase Change Heat Transfer, Micro and Nanoscale Phase Change Heat Transfer Gordon Research Seminar*.
6. **Schaefer, L.**, 2018, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Mechanical Engineering Department, Purdue University*.
7. **Schaefer, L.**, 2018, "Creating Better Energy Systems," *Mechanical Engineering Department, University of Houston*.
8. **Schaefer, L.**, 2018, "The Future of Mechanical Engineering: Driving the Engineering Agenda," *GWW School of Mechanical Engineering, Georgia Tech*.
9. Rao, P.[†], and **Schaefer, L.**, 2017, "Lattice Boltzmann simulations of immiscible displacement process with large viscosity ratios," *70th Annual Meeting of the APS Division of Fluid Dynamics*, F35.00008.
10. **Schaefer, L.**, 2015, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Mechanical Engineering Department, University of Texas*.
11. **Schaefer, L.**, and Tourkov, K.[†], 2015, "Thermoacoustic Sound Generation Under the Influence of Resonator Curvature," *ASHRAE Winter Meeting*, Chicago, IL, Seminar 58.
12. Chen, L.[†], and **Schaefer, L.**, 2014, "A conservative Dirichlet boundary treatment for the finite volume lattice Boltzmann method," *67th Annual Meeting of the APS Division of Fluid Dynamics*, L31.00009.
13. Rao, P.[†], and **Schaefer, L.**, 2014, "Thermal lattice Boltzmann simulations with non-space-filling lattices," *67th Annual Meeting of the APS Division of Fluid Dynamics*, L31.00010.
14. **Schaefer, L.**, 2014, "Sustainable Energy Systems: A Thermofluids Approach," *Mechanical Engineering Department, Rice University*, invited presentation.
15. Xu, L.[†], and **Schaefer, L.**, 2013, "A New Moving Boundary Condition in Particulate Suspensions with the Lattice Boltzmann Method," *66th Annual Meeting of the APS Division of Fluid Dynamics*, vol. 58, no. 18, R32.00008.
16. Chen, L.[†], and **Schaefer, L.**, 2013, "2D Unstructured Finite Volume Lattice Boltzmann Model for Flow with Complex Geometric Boundaries," *66th Annual Meeting of the APS Division of Fluid Dynamics*, vol. 58, no. 18, G5.00001.

17. Rao, P.[†], and **Schaefer, L.**, 2013, "A Second-Order Finite-Difference Scheme for the Lattice Boltzmann Method," *66th Annual Meeting of the APS Division of Fluid Dynamics*, vol. 58, no. 18, G5.00002.
18. Ikeda, M.[†], and **Schaefer, L.**, 2013, "Development of a Thermal, Multiphase, Multicomponent Lattice Boltzmann Model," *ASME Summer Heat Transfer Conference*, HT2013-17736.
19. **Schaefer, L.**, 2013, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering and Materials Science, Yale University*, invited presentation.
20. **Schaefer, L.**, 2013, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering and Materials Science, Nanyang Technological University*, invited presentation.
21. **Schaefer, L.**, 2013, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering, Drexel University*, invited presentation.
22. Ikeda, M.[†], and **Schaefer, L.**, 2012, "Lattice Boltzmann Simulation of Thermal Multiphase Flows with Dynamic Wall Interactions," *65th Annual Meeting of the APS Division of Fluid Dynamics*, E3.01.
23. Chen, L.[†], and **Schaefer, L.**, 2012, "Hybrid Lattice-Boltzmann model for Thermally Coupled Fluid-Solid Problem," *65th Annual Meeting of the APS Division of Fluid Dynamics*, E5.02.
24. Xu, L.[†], and **Schaefer, L.**, 2012, "Numerical Study of the Boundary Conditions in Particulate Suspensions with the Lattice Boltzmann Method," *ASME, International Mechanical Engineering Congress and Exposition, IMECE2012-93999*.
25. Rao, P.[†], and **Schaefer, L.**, 2012, "Higher Order Thermal Lattice Boltzmann Method based on Hermite Series Expansion," *21st International Conference on Discrete Simulation of Fluid Dynamics*, Bangalore, India.
26. Ikeda, M.[†], and **Schaefer, L.**, 2011, "Lattice Boltzmann Simulation of a Vapor Bubble in a 2D Microchannel," *64th Annual Meeting of the APS Division of Fluid Dynamics*, vol. 56, no. 18.
27. Collinge, W.[‡], Liao, L.[†], Xu, H.[†], Saunders, C.[†], Bilec, M., Landis, A., Jones, A.K., and **Schaefer, L.**, 2011, "Enabling Dynamic Life Cycle Assessment of Buildings with Wireless Sensor Networks," *Proceedings of the 2011 IEEE International Symposium on Sustainable Systems & Technology (ISSST)*, Chicago, IL, doi: 10.1109/ISSST.2011.5936846.
28. **Schaefer, L.**, 2010, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering and Materials Science, Rice University*, invited presentation.
29. **Schaefer, L.**, 2010, "Simulation of a Flat-Tube Solid Oxide Fuel Cell," *Advances in Small Scale Heat Exchangers and Fuel Cell Thermal Management, Indian Institute of Technology-Delhi*, invited presentation.
30. Kerzmann, T.[†], and **Schaefer, L.**, 2009, "Hybrid Four Parameter Multijunction Cell Model," *Engineering Sustainability 2009: Innovations that Span Boundaries*, seminar presentation.

Laura A. Schaefer

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EDUCATION

Georgia Institute of Technology, Atlanta, Georgia.

Ph.D. in Mechanical Engineering, August 2000.

M.S. in Mechanical Engineering, December 1997.

Ph.D. Dissertation: Single Pressure Absorption Heat Pump Analysis.

M.S. Thesis: Heat Exchanger Mean Temperature Differences for Refrigerant Mixtures.

Advisor: Dr. Samuel V. Shelton.

Minor: Operations Research (Optimization).

Rice University, Houston, Texas.

B.S. in Mechanical Engineering, May 1995.

B.A. in English, May 1995.

ACADEMIC POSITIONS

Burton J. and Ann McMurtry Chaired Professor, July 2015 - Present.

Department of Mechanical Engineering, Rice University, Houston, Texas.

Professor, September 2013 - June 2015.

Associate Professor, August 2006 - August 2013.

Assistant Professor, August 2000 - July 2006.

Bicentennial Board of Visitors Faculty Fellow, September 2005 - June 2015.

Mechanical Engineering and Materials Science Department, University of Pittsburgh, Pittsburgh, Pennsylvania.

Visiting Researcher, September 2011 - June 2012.

Energy Futures Laboratory, Imperial College, London, UK.

Graduate Research Assistant, September 1998 - August 2000.

NSF Graduate Research Fellow, September 1995 - August 1998.

Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia.

ACADEMIC LEADERSHIP EXPERIENCE

Department Chair, July 2015 - Present.

Department of Mechanical Engineering, Rice University, Houston, Texas.

Associate Director, January 2008 - May 2015.

Center for Energy, University of Pittsburgh, Pittsburgh, Pennsylvania.

Deputy Director, September 2006 - June 2015.

Mascaro Center for Sustainable Innovation, University of Pittsburgh, Pittsburgh, Pennsylvania.

HONORS AND AWARDS

Fellow, American Society of Mechanical Engineers, 2011.

Bicentennial Board of Visitors Faculty Fellow, School of Engineering, University of Pittsburgh, 2005 - 2015.

CAREER Award, National Science Foundation, Chemical and Transport Systems, 2003.

New Investigator Award, American Society of Heating, Refrigerating, & Air-Conditioning Engineers, 2002.

Faculty Honor Roll, School of Engineering, University of Pittsburgh, 2002.

Faculty for the Future Startup Fellowship (Faculty Coupon), General Electric Foundation, 2000.

Life Member's Scholarship, Georgia Engineering Foundation, 1999 - 2000.

Graduate Teaching Fellowship, American Society of Mechanical Engineers, 1998 - 2000.

Best Paper, Thermodynamic Analysis of Energy Systems, Advanced Energy Systems Division, ASME, 1999.

Graduate Grant-In-Aid, ASHRAE, 1998.

Graduate Research Fellowship, National Science Foundation, 1995 - 98.

Sylvia Farny Scholarship, American Society of Mechanical Engineers, 1994 - 95.

RESEARCH OVERVIEW

My research area is the analysis, design and optimization of energy systems. My energy systems research relies on a solid basis of computational thermal/fluids modeling and to date has focused on topics such as:

- fluid and heat transfer properties of two-phase binary zeotropic flow in microchannels,
- cogeneration system heat and mass transfer modeling,
- the multiphase, multicomponent lattice Boltzmann method,
- increased efficiency in energy conversion and utilization, and
- design and characterization of thermoacoustic Stirling engines.

This research has received over \$12 million in funding by organizations such as NSF, AFOSR, ASHRAE, DOE, and NCIIA.

JOURNAL PAPERS

1. Perdue, D.[†], Chen, L.[‡], and **Schaefer, L.**, 2020, "Exergetic Relationship Between the Thermal Properties of Direct Contact Membrane Distillation," *ASME Journal of Heat Transfer*, HT-19-1220, in press.
2. Agbim, K.A.[†], and **Schaefer, L.**, 2020, "Investigation of Thermoresponsive Microgel Polymer Swelling Theory," *Polymer Reviews*, in press (available online), <https://doi.org/10.1080/15583724.2019.1711392>.
3. Rao, P.[‡], and **Schaefer, L.**, 2019, "Lattice Boltzmann models for micro-tomographic pore-spaces," *Computers and Fluids*, vol. 193, p. 104294, doi: 10.1016/j.compfluid.2019.104294.
4. Fernandes, M.[†], and **Schaefer, L.**, 2019, "Long-term environmental impacts of a small-scale spectral filtering concentrated photovoltaic-thermal system," *Energy Conversion and Management*, vol. 184, pp. 350-361, doi: 10.1016/j.enconman.2019.01.026.

[†] Graduate Student

[‡] Post-Doctoral Researcher/Research Scientist

5. Chen, L.[‡], and **Schaefer, L.**, 2018, "Gudunov-type upwind flux schemes of the two-dimensional finite volume discrete Boltzmann method," *Computers & Mathematics with Applications*, vol. 75, no. 9, pp. 3105-3126, <https://doi.org/10.1016/j.camwa.2018.01.034>.
6. Whiston, M.[†], Collinge, W.O., Bilec, M.M., and **Schaefer, L.**, 2017, "Exergy and economic comparison between kW-scale hybrid and stand-alone solid oxide fuel cell systems," *Journal of Power Sources*, vol. 353, pp. 152-166; doi: <https://doi.org/10.1016/j.jpowsour.2017.03.113>.
7. Xu, L.[†], Rao, P.[‡], and **Schaefer, L.**, 2016, "A novel scheme for curved moving boundaries in the lattice Boltzmann method," *International Journal of Modern Physics C*, vol. 27, no. 12, p. 1650144, doi: 10.1142/S0129183116501448.
8. Collinge, W.O.[‡], DeBlois, J.C.[†], Landis, A.E., **Schaefer, L.A.**, and Bilec, M.M., 2016, "A hybrid dynamic-empirical building energy modeling approach for an existing campus building," *ASCE Journal of Architectural Engineering*, p. 04015010, doi: 10.1061/(ASCE)AE.1943-5568.0000183.
9. Xu, H., Li, Y., Collinge, W.O.[‡], **Schaefer, L.A.**, Landis, A.E., Bilec, M.M., and Jones, A.K., 2016, "Towards a commodity solution for the internet of things," *Computers & Electrical Engineering*, vol. 52, pp. 138-156, <http://dx.doi.org/10.1016/j.compeleceng.2016.03.009>.
10. Whiston, M.W.[†], Bilec, M.M., and **Schaefer, L.**, 2015, "Influence of the charge double layer on solid oxide fuel cell stack behavior," *Journal of Power Sources*, vol. 293, pp. 767-777, doi: 10.1016/j.jpowsour.2015.05.085.
11. Whiston, M.W.[†], Bilec, M.M., and **Schaefer, L.**, 2015, "SOFC stack model for integration into a hybrid system," *ASME Journal of Fuel Cell Science and Technology*, vol. 12, no. 3, p. 031006, doi: 10.1115/1.4029877.
12. Tourkov, K.[†], and **Schaefer, L.**, 2015, "Performance evaluation of a PVT/ORC system with optimization of the ORC and evaluation of several PV materials," *Energy*, vol. 82, pp. 839-849, doi: 10.1016/j.energy.2015.01.094.
13. Tourkov, K.[†], and **Schaefer, L.**, 2015, "Effect of Regenerator Positioning on Thermoacoustic Effect in a Looped Tube Traveling Wave Thermoacoustic Engine," *Energy Conversion and Management*, vol. 95, pp. 94-100, doi: 10.1016/j.enconman.2015.02.027.
14. Chen, L.[†], and **Schaefer, L.**, 2015, "A unified and preserved Dirichlet boundary treatment for the cell-centered finite volume discrete Boltzmann method," *Physics of Fluids*, vol. 27, p. 027104, doi: 10.1063/1.4907782.
15. Olinzock, M.A.[†], Landis, A.E., Saunders, C.L.[†], Collinge, W.O.[‡], Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2015, "Life cycle assessment use in the North American building community: summary of findings from a 2011/2012 survey," *The International Journal of Life Cycle Assessment*, vol. 20, pp. 318-331, doi: 10.1007/s11367-014-0834-y.
16. Rao, P.R.[†], and **Schaefer, L.**, 2015, "Numerical Stability of Explicit Off-Lattice Boltzmann Schemes: A Comparative Study," *Journal of Computational Physics*, vol. 285, pp. 251-264, doi: 10.1016/j.jcp.2015.01.017.

17. Tourkov, K.[†], Zink, F.[†], and **Schaefer, L.**, 2015, "Thermoacoustic Sound Generation Under the Influence of Resonator Curvature," *International Journal of Thermal Sciences*, vol. 88, pp. 158-163, doi: 10.1016/j.ijthermalsci.2014.09.016.
18. Collinge, W.O.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2014, "Productivity Metrics in Dynamic LCA for Whole Buildings: Using a Post-Occupancy Evaluation of Energy and Indoor Environmental Quality Tradeoffs," *Building and Environment*, vol. 82, pp. 339-348, doi: 10.1016/j.buildenv.2014.08.032.
19. Ikeda, M.K.[†], Rao, P.R.[†], and **Schaefer, L.A.**, 2014, "A Thermal Multicomponent Lattice Boltzmann Model," *Computers and Fluids*, vol. 101, pp. 250-262, doi: 10.1016/j.compfluid.2014.06.006.
20. Kimber, M., Clark, W.W., and **Schaefer, L.**, 2014, "Conceptual Analysis and Design of a Partitioned Multifunctional Smart Insulation," *Applied Energy*, vol. 114, pp. 310-319, doi: 10.1016/j.apenergy.2013.09.067.
21. Saunders, C.L.[†], Landis, A.E., Mecca, L.P., Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2013, "Analyzing the Practice of Life Cycle Assessment: Focus on the Building Sector," *Journal of Industrial Ecology*, vol. 17, no. 5, pp. 777-788, doi: 10.1111/jiec.12028.
22. Thiel, C.L.[†], Champion, N.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, Bilec, M.M., 2013, "A Materials Life Cycle Assessment of a Net-Zero Energy Building," *Energies*, vol. 6, pp. 1125-1141, doi: 10.3390/en6021125.
23. Kim, G., **Schaefer, L.**, Lim, T.S., and Kim, J.T., 2013, "Thermal Comfort Prediction of an Underfloor Air Distribution System in a Large Indoor Environment," *Energy and Buildings*, vol. 64, pp. 323-331, doi: 10.1016/j.enbuild.2013.05.003.
24. DeBlois, J.[†], Bilec, M., and **Schaefer, L.**, 2013, "Simulating Home Cooling Load Reductions for a Novel Opaque Roof Solar Chimney Configuration," *Applied Energy*, vol. 112, pp. 142-151, doi: 10.1016/j.apenergy.2013.05.084.
25. Collinge, W.O.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, Bilec, M.M., 2013, "Indoor Environmental Quality in a Dynamic Life Cycle Assessment Framework for Whole Buildings: Focus on Human Health Chemical Impacts," *Building and Environment*, vol. 62, pp. 182-190, doi: 10.1016/j.buildenv.2013.01.015.
26. Bao, J.[†], and **Schaefer, L.**, 2013, "Lattice Boltzmann Equation Model for Multi-Component Multi-Phase Flow with High Density Ratios," *Journal of Applied Mathematical Modelling*, vol. 37, no. 4, doi:10.1016/j.apm.2012.04.048.
27. DeBlois, J.[†], Bilec, M., and **Schaefer, L.**, 2013, "Design and Zonal Building Information Modeling of a Roof Integrated Solar Chimney," *Renewable Energy*, vol. 52, pp. 241-250, doi:10.1016/j.renene.2012.10.023.
28. Kim, G., Lim, H.S., **Schaefer, L.**, and Kim, J.T., 2013, "Overall Environmental Modelling of Newly Designed Curtain Wall Façade Configurations," *Indoor and Built Environment*, vol. 22, no. 1, pp. 168-179, doi:10.1177/1420326X12470281.

29. Kim, G., **Schaefer, L.**, and Kim, J.T., 2013, "Development of a Double-Skin Façade for Sustainable Renovation of Old Residential Buildings," *Indoor and Built Environment*, vol. 22, no. 1, pp. 180-190, doi:10.1177/1420326X12469533.
30. Collinge, W.O.[†], Landis, A.E., Jones, A.K., **Schaefer, L.A.**, and Bilec, M.M., 2013, "Dynamic Life Cycle Assessment: Framework and Application to an Institutional Building," *International Journal of Life Cycle Assessment*, vol. 18, no. 3, pp. 538-552, doi:10.1007/s11367-012-0528-2.
31. Kerzmann, T.[†], and **Schaefer, L.**, 2013, "Flowrate Optimization of a Linear Concentrating Photovoltaic System," *Journal of Solar Energy Engineering*, vol. 135, no. 2, doi: 10.1115/1.4023006.
32. Kerzmann, T.[†], and **Schaefer, L.**, 2012, "System Simulation of a Linear Concentrating Photovoltaic System with an Active Cooling System," *Renewable Energy*, vol. 41, pp. 254-261, doi:10.1016/j.renene.2011.11.004.
33. Kim, G., Kim, H.S., Lim, T.S., **Schaefer, L.**, and Kim, J.T., 2012, "Comparative Advantage of an Exterior Shading Device in Thermal Performance for Residential Buildings," *Energy and Buildings*, vol. 46, pp. 105-111, doi:10.1016/j.enbuild.2011.10.040.
34. Lim, T.S., **Schaefer, L.**, Kim, J.T., and Kim, G., 2011, "Energy Benefit of the Underfloor Air Distribution System for Reducing Air-Conditioning and Heating Loads in Buildings," *Indoor and Built Environment*, vol. 21, no. 1, pp. 62-70, doi:10.1177/1420326X11419345.
35. Ikeda, M.[†], and **Schaefer, L.A.**, 2011, "Examining the Effect of Binary Interaction Parameters on VLE Modelling using Cubic Equations of State," *Fluid Phase Equilibria*, vol. 305, no. 2, pp. 233-237, doi: 10.1016/j.fluid.2011.03.029.
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PRESENTATIONS AND OTHER CONFERENCE PROCEEDINGS

1. **Schaefer, L.**, 2019, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Mechanical Engineering Department, CU-Boulder*.

2. **Schaefer, L.**, 2019, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Mechanical Engineering Department, Texas A&M*.
3. **Schaefer, L.**, 2019, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Sustainable City Laboratory, Hong Kong PolyU*.
4. **Schaefer, L.**, 2019, "Lattice Boltzmann Approaches to Multiphase Flow and Phase Change," *Simulation and Modeling of Phase Change Processes, Micro and Nanoscale Phase Change Heat Transfer Gordon Research Conference*.
5. **Schaefer, L.**, 2019, "Mentorship Component: Career Paths and Differences Between Academia, Industry and Government," panel member, *From Physical Understanding to Application Enhancement of Phase Change Heat Transfer, Micro and Nanoscale Phase Change Heat Transfer Gordon Research Seminar*.
6. **Schaefer, L.**, 2018, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Mechanical Engineering Department, Purdue University*.
7. **Schaefer, L.**, 2018, "Creating Better Energy Systems," *Mechanical Engineering Department, University of Houston*.
8. **Schaefer, L.**, 2018, "The Future of Mechanical Engineering: Driving the Engineering Agenda," *GWW School of Mechanical Engineering, Georgia Tech*.
9. Rao, P.[†], and **Schaefer, L.**, 2017, "Lattice Boltzmann simulations of immiscible displacement process with large viscosity ratios," *70th Annual Meeting of the APS Division of Fluid Dynamics*, F35.00008.
10. **Schaefer, L.**, 2015, "From Microchannels to Micropower: Modeling Sustainable Energy Systems," *Mechanical Engineering Department, University of Texas*.
11. **Schaefer, L.**, and Tourkov, K.[†], 2015, "Thermoacoustic Sound Generation Under the Influence of Resonator Curvature," *ASHRAE Winter Meeting*, Chicago, IL, Seminar 58.
12. Chen, L.[†], and **Schaefer, L.**, 2014, "A conservative Dirichlet boundary treatment for the finite volume lattice Boltzmann method," *67th Annual Meeting of the APS Division of Fluid Dynamics*, L31.00009.
13. Rao, P.[†], and **Schaefer, L.**, 2014, "Thermal lattice Boltzmann simulations with non-space-filling lattices," *67th Annual Meeting of the APS Division of Fluid Dynamics*, L31.00010.
14. **Schaefer, L.**, 2014, "Sustainable Energy Systems: A Thermofluids Approach," *Mechanical Engineering Department, Rice University*, invited presentation.
15. Xu, L.[†], and **Schaefer, L.**, 2013, "A New Moving Boundary Condition in Particulate Suspensions with the Lattice Boltzmann Method," *66th Annual Meeting of the APS Division of Fluid Dynamics*, vol. 58, no. 18, R32.00008.
16. Chen, L.[†], and **Schaefer, L.**, 2013, "2D Unstructured Finite Volume Lattice Boltzmann Model for Flow with Complex Geometric Boundaries," *66th Annual Meeting of the APS Division of Fluid Dynamics*, vol. 58, no. 18, G5.00001.

17. Rao, P.[†], and **Schaefer, L.**, 2013, "A Second-Order Finite-Difference Scheme for the Lattice Boltzmann Method," *66th Annual Meeting of the APS Division of Fluid Dynamics*, vol. 58, no. 18, G5.00002.
18. Ikeda, M.[†], and **Schaefer, L.**, 2013, "Development of a Thermal, Multiphase, Multicomponent Lattice Boltzmann Model," *ASME Summer Heat Transfer Conference*, HT2013-17736.
19. **Schaefer, L.**, 2013, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering and Materials Science, Yale University*, invited presentation.
20. **Schaefer, L.**, 2013, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering and Materials Science, Nanyang Technological University*, invited presentation.
21. **Schaefer, L.**, 2013, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering, Drexel University*, invited presentation.
22. Ikeda, M.[†], and **Schaefer, L.**, 2012, "Lattice Boltzmann Simulation of Thermal Multiphase Flows with Dynamic Wall Interactions," *65th Annual Meeting of the APS Division of Fluid Dynamics*, E3.01.
23. Chen, L.[†], and **Schaefer, L.**, 2012, "Hybrid Lattice-Boltzmann model for Thermally Coupled Fluid-Solid Problem," *65th Annual Meeting of the APS Division of Fluid Dynamics*, E5.02.
24. Xu, L.[†], and **Schaefer, L.**, 2012, "Numerical Study of the Boundary Conditions in Particulate Suspensions with the Lattice Boltzmann Method," ASME, *International Mechanical Engineering Congress and Exposition*, IMECE2012-93999.
25. Rao, P.[†], and **Schaefer, L.**, 2012, "Higher Order Thermal Lattice Boltzmann Method based on Hermite Series Expansion," *21st International Conference on Discrete Simulation of Fluid Dynamics*, Bangalore, India.
26. Ikeda, M.[†], and **Schaefer, L.**, 2011, "Lattice Boltzmann Simulation of a Vapor Bubble in a 2D Microchannel," *64th Annual Meeting of the APS Division of Fluid Dynamics*, vol. 56, no. 18.
27. Collinge, W.[‡], Liao, L.[†], Xu, H.[†], Saunders, C.[†], Bilec, M., Landis, A., Jones, A.K., and **Schaefer, L.**, 2011, "Enabling Dynamic Life Cycle Assessment of Buildings with Wireless Sensor Networks," *Proceedings of the 2011 IEEE International Symposium on Sustainable Systems & Technology (ISSST)*, Chicago, IL, doi: 10.1109/ISSST.2011.5936846.
28. **Schaefer, L.**, 2010, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering and Materials Science, Rice University*, invited presentation.
29. **Schaefer, L.**, 2010, "Simulation of a Flat-Tube Solid Oxide Fuel Cell," *Advances in Small Scale Heat Exchangers and Fuel Cell Thermal Management, Indian Institute of Technology-Delhi*, invited presentation.
30. Kerzmann, T.[†], and **Schaefer, L.**, 2009, "Hybrid Four Parameter Multijunction Cell Model," *Engineering Sustainability 2009: Innovations that Span Boundaries*, seminar presentation.

31. **Schaefer, L.**, 2009, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Science and Engineering, University of Illinois at Urbana-Champaign*, invited presentation.
32. **Schaefer, L.**, 2009, "From Micropower to Microchannels: Modeling Sustainable Energy Systems," *Mechanical Engineering, University of California-Berkeley*.
33. Miller, V.[†], and **Schaefer, L.**, 2008, "Energy Policy and its Application to Sustainable Small Scale Hydropower Development," *AASHE '08 Proceedings*, poster presentation.
34. Miller, V.[†], and **Schaefer, L.**, 2008, "Hydrokinetic Energy Extraction," *Student Industrial Ecology Conference*, poster presentation.
35. Miller, V., Landis, A., and **Schaefer, L.**, 2008, "Hydrokinetic Energy Extraction: Progress, Modeling, and Environmental Concerns," *UKERC Sparks: Energy Research in Context*, poster presentation.
36. Zink, F.[†], Vipperman, J., and **Schaefer, L.**, 2008, "Environmental Motivation to Switch to Thermoacoustic Refrigeration," *AASHE '08 Proceedings*, poster presentation.
37. **Schaefer, L.**, 2007, "Green Energy Systems for Buildings and Small Communities," *Frontiers in Transport Phenomena Research and Education*, NSF Sponsored Workshop, University of Connecticut, invited presentation.
38. **Schaefer, L.**, 2007, "Distributed Generation: One Example of Environmental and Economic Implications," *Engineering Sustainability 2007*, invited presentation.
39. Kerzmann, T.[†], Zink, F.[†], and **Schaefer, L.**, 2007, "Industrial Symbiosis - Sharing and Recycling Water Resources," *Engineering Sustainability 2007*, poster presentation.
40. Miller, V.[†], Fuchs, A.[†], Rossi, G.[†], and **Schaefer, L.**, 2007, "Green Roofs: Alleviating Urban Stress," *Engineering Sustainability 2007*, poster presentation.
41. Beckman, E., Sacre, M. B., Kovalcik, G., Mehalik, M., Ries, R., Needy, K., **Schaefer, L.**, and Shuman, L., 2007, "Combining Educational Studies, Research and International Experiences in Sustainable Engineering," *ASEE Annual Conference and Exposition*, Environmental Engineering Division.
42. Needy, K., Beckman, E., Sacre, M. B., Kovalcik, G., **Schaefer, L.**, and Shuman, L., 2006, "Combining Graduate Studies, Research and International Experiences in Sustainability," *ASEE Annual Conference and Exposition*, Environmental Engineering Division.
43. Beckman, E., Sacre, M. B., Kovalcik, G., Mehalik, M. M., Needy, K. L., Ries, R., **Schaefer, L.**, Shuman, L., and Kowaltowski, D., 2006, "Creating the Holistic Engineer: A Focus on Sustainability in an International Setting," *5th Annual ASEE Global Colloquium on Engineering Education*.
44. **Schaefer, L.**, 2005, "From Micropower to Microchannels: Energy Systems at Multiple Scales," *G.W.W. School of Mechanical Engineering, Georgia Institute of Technology*, invited presentation.

45. Guido, M.[†], and **Schaefer, L.**, 2005, “Heat Transfer Modeling,” *Western Pennsylvania ANSYS User's Group*, research presentation.
46. **Schaefer, L.**, 2005, “From Micropower to Microchannels: Energy Systems at Multiple Scales,” *Department of Mechanical and Aerospace Engineering, University of Florida*, invited presentation.
47. **Schaefer, L.**, 2005, “ASHRAE Research Opportunities,” *ASHRAE: Pittsburgh Chapter*, invited presentation.
48. **Schaefer, L.**, 2005, “From Micropower to Microchannels: Energy Systems at Multiple Scales,” *Mechanical Engineering Department, Stanford University*, invited presentation.
49. **Schaefer, L.**, and Yuan, P., 2004, “Modeling Two-Phase Microchannel Flow,” *ASHRAE: TC 8.3, Anaheim, CA*, research presentation.
50. **Schaefer, L.**, 2003, “Modeling and Analysis of Proton Exchange Membrane and Solid Oxide Fuel Cells,” *CMU: Institute for Complex Engineered Systems*, invited presentation.
51. **Schaefer, L.**, 2003, “Alternative Vehicle Technologies,” *GSPIA: Panel on the Greening of Public Transportation*, invited presentation.
52. **Schaefer, L.**, 2003, “A Portable Insulin Cooler,” *ASHRAE: Pittsburgh Chapter*, invited presentation.
53. Kreke, J.[†], Roberts, N., Norman, B., Ries, R., **Schaefer, L.**, and Schaefer, A., 2001, “Optimal Location and Operation of Co-Generators for Energy System Design,” *Proceedings of the Sandia National Lab/CUSTOM Conference*, poster presentation.
54. **Schaefer, L.**, 2001, “Designing Energy Systems Under Uncertainty,” *Proceedings of the Sandia National Lab/CUSTOM Conference*, invited presentation.
55. **Schaefer, L. A.**, and Shelton, S. V., 1998, “The Economic Payoff for Global Warming Emissions Reduction (Part 1),” *University System of Georgia Research Symposium*, seminar presentation.

PATENTS

1. Clark, W.W., **Schaefer, L.A.**, Knotts, W.A.[†], Mo, C.[‡], and Kimber, M., 2013, *Variable Thermal Insulation*, U.S. Patent Application 13/525,848.
2. Mickle, M.H., Maina, J.Y.[†], Lovell, M.R., and **Schaefer, L.A.**, 2010, *Method and system for securely communicating information using multiple RF carriers*, U.S. Patent 7,747,274.

RESEARCH FUNDING

Peer-Reviewed Grants

A Roadmap Toward a Sustainable Vehicle Fleet in Houston, Co-PI, Kinder Institute, 2018-2020, \$100,000.

A Deeper Understanding of Small-Scale Phenomena in Heat Pipes through a Higher Order Lattice Boltzmann Method, PI, NSF: CBET, 2012-2017, \$280,000.

EFRI-SEED: BUILD - Barriers, Understanding, Integration - Life Cycle Development, Co-PI, NSF: EFRI, 2010-2014, \$2,000,000.

An Integrative Undergraduate Research Experience II, Co-PI, NSF: IRES, 2010-2013, \$149,853.

Environmentally Sound: Thermoacoustic Refrigeration, PI, NSF: CTS, 2007-2011, \$300,000.

US-Brazil Partnership in Sustainability and Innovative Design, Senior Personnel, US DOE: FIPSE/CAPES, 2007-2012, \$197,317.

Sustainable Design, Senior Personnel, NSF: REU Site, 2007-2010, \$310,000.

International Sustainability Research: An Integrative Undergraduate Experience, Co-PI, NSF: OISE, 2006-2009, \$150,000.

Development of an Inter-Disciplinary Fellowship Program in Sustainable Engineering, Co-PI, then PI for last 2 years of grant, US DOE: GAANN, 2006-2011, \$506,000.

University of Pittsburgh Engineering Sustainability Program (UPESP), Co-PI, then PI for last 3 years of grant, NSF: Integrative Graduate Education and Research Traineeship Program (IGERT), 2005-2012, \$3,386,647.

Microfabricated Thermoacoustic Refrigerators for Electronics Cooling Applications, Co-PI, NSF: ECS, 2005-2007, \$95,000.

CAREER: Microscale Two-Phase Zeotropic Flow in Energy Systems, PI, NSF: CTS, 2003-2008, \$405,107.

Seamless Integration of Information Devices: A Focus on Emerging Technologies in New Product Development, Co-PI, NSF: Combined Research-Curriculum Development, 2002-2005, \$450,000.

New Investigator Award, PI, American Society of Heating, Refrigerating and Air-Conditioning Engineers, 2002-2005, \$30,000 plus \$15,000 in matching funds.

JackHeat: A Lightweight, Fashionable, Self-Heating Jacket, PI, NCIIA, 2001-2002, \$14,200.

Other Grants

Next-Generation Digital Rock Physics, PI, Creative Ventures Fund: Energy and Environment, 2018-2019, \$50,000.

Greater Philadelphia Innovation Cluster for Energy Efficient Buildings, Lead Sub-Contractor for U. Pitt, DOE: Energy Regional Innovation Cluster, 2011-2014, \$500,000 (sub-contract amount)

Investigation of Thermal Semiconductors for Adaptive Heat Management in Buildings, Co-PI, Mascaro Center for Sustainable Innovation, 2008-2010, \$55,000.

Enhanced Water Recovery of Power Plant Cooling Tower Systems, Co-PI, National Energy Technology Laboratory Collaborative Initiative, 2008-2009, \$126,795.

Research in Sustainable Community Development, Senior Personnel, Pitt: GAP, 2006-2007, \$20,000.

Comprehensive Characterization of Oxy-Fuel/Hydrogen Turbine Systems, PI, NETL-CPW Collaborative Initiative, 2005-2006, \$192,000.

Energy Harvesting, Co-PI, Bechtel Bettis, Inc., 2005-2006, \$215,000.

Next Generation Solid-State Illumination Systems for Green Construction, PI, Mascaro Sustainability Initiative, 2005-2006, \$55,000.

Green Structural Neurology - A Nervous System for Green Buildings, Co-PI, Mascaro Sustainability Initiative, 2004-2005, \$54,000.

Water Management of a Micro-Scale Direct Methanol Fuel Cell, Co-PI, Pennsylvania Infrastructure Technology Alliance, 2004-2005, \$45,496.

Interactive Visualization in Turbulent Combustion and Microscale Energy Systems, PI, Defense University Research Instrumentation Program, 2003-2005, \$150,529.

RF Skin Depth Experimentation and Analysis for Antennas, Co-PI, Swanson Center for Micro and Nano Systems, 2003-2004, \$30,000.

Design, Construction, & Analysis of a Portable, Temperature-Regulated Insulin Carrier, PI, ASHRAE: Undergraduate Senior Project Grant, 2003-2004, \$5,000.

Faculty Coupon, PI, General Electric Foundation, 2001-2004, \$20,000.

A Micro Proton Exchange Membrane Fuel Cell, Co-PI, Pittsburgh Digital Greenhouse, 2001-2003, \$90,000.

A Methodology for Hybrid Chiller Systems, PI, U. Pitt Research Development Fund, 2001-2003, \$15,992.

TEACHING EXPERIENCE

Rice University (Enrollment by term given in parentheses)

MECH 200: Thermodynamics, Spring 2020 (64).

MECH 472: Thermal Systems, Fall 2015 (59), Fall 2016 (65), Fall 2017 (69), Fall 2018 (56).

Average Effectiveness as a Teacher: 1.21 (5 point scale, where 1.0 is the best score).

Representative Comments from Evaluations: “I am so happy to have had Dr. Schaefer as a professor. She is brilliant and nerdy and full of energy.” “Schaefer is amazing! One of the smartest, friendliest professors in the Mech department.” “Professor Schaefer has to be the most passionate professor I have had thus far.” “Dr. Schaefer is a very effective teacher. She is very clear about her expectations and is always willing to help a student out.”

University of Pittsburgh

Undergraduate Courses

MEMS 1051: Advanced Thermodynamics, Fall 2014 (124), Fall 2013 (78), Fall 2012 (79), Fall 2010 (60), Fall 2009 (77), Spring 2007 (76), Spring 2006 (46), Fall 2003 (39), Spring 2003 (6), Fall 2002 (30), Spring 2002 (14). *Average Effectiveness as a Teacher: 4.3/5.0 (5.0 is the best score).*

MEMS 1065: Thermal Systems Analysis and Design, Spring 2015 (35), Spring 2014 (30), Spring 2013 (79), Spring 2010 (73), Fall 2008 (52), Fall 2007 (78), Fall 2006 (Partial Semester, 47), Fall 2005 (38), Fall 2004 (17), Fall 2003 (10), Fall 2001 (6), Spring 2001 (10). *Average Effectiveness as a Teacher: 4.3/5.0.*

ME 1071: Fluid Mechanics I, Fall 2000 (24). *Effectiveness as a Teacher: 4.0/5.0.*

MEMS 1085: Undergraduate Seminar, Spring 2006 (263), Fall 2002 (150), Spring 2002 (150), Fall 2001 (150).

Graduate Courses

CEE 2210: Powering the Campus of the Future (Joint Class with Carnegie-Mellon University), Fall 2001 (24).

ENGR 2200: Introduction to Sustainable Engineering, Fall 2006 (7). (*Qualitative Evaluations Only.*)

ENGR 3200: Engineering Sustainability: Capstone Definition, Spring 2011 (8), Fall 2009 (5), Spring 2008 (8). *Effectiveness as a Teacher: 4.5/5.0.*

ENGR 3210: Engineering Sustainability: Capstone Realization, Fall 2010 (1), Spring 2010 (2), Summer 2009 (2), Summer 2008 (6). (*Qualitative Evaluations Only.*)

ME 2085: ME Graduate Seminar, Fall 2004 (26).

ME 2074: Graduate Fluid Mechanics I, Spring 2003 (11). *Effectiveness as a Teacher: 3.55/5.0.*

ME 3007: Energetics, Fall 2010 (7), Fall 2008 (11), Fall 2007 (7), Fall 2004 (6). *Effectiveness as a Teacher: 3.68/5.0.*

Representative Comments from Evaluations: “Dr. Schaefer is probably the best engineering professor I have had in the last four years.” “One of the best teachers at Pitt.” “Cares about students and what they learn.” “Very comfortable learning environment.” “Ability to make a difficult subject very interesting and understandable.” “Excellent at getting the class interested in learning.”

Georgia Institute of Technology

Thermal Systems Analysis, Winter 1999, Doctoral Teaching Intern, Assisted Professor James Hartley. *Effectiveness as a Teacher: 4.6/5.0.*

Thermodynamics I, Spring 1999, Teaching Practicum, Assisted Professor Sam Shelton.

Fluid Mechanics I, Spring 1996, Teaching Practicum, Assisted Professor G. Paul Neitzel.

SUPERVISORY ACTIVITIES

Ph.D. Students

Ricardo Poveda, August 2018 - Present.
Nick Jean-Louis, August 2017 - Present.
Tim Petrosius, August 2017 - Present.
Kenechi Agbim, August 2017 - Present.
Marcelo Fernandes, August 2016 - Present.
Mohammed Nemer, August 2016 - Present.
Danielle Perdue, August 2016 - Present.
Konstantin Tourkov, *Optimization of Large Scale Solar Thermal Generation*, Graduated August 2016, Current Employer: Rand.
Leitao Chen, *Characterization of Flows through Graphite Foams*, Graduated January 2016, Current Employer: Rice University.
Michael Whiston, *Design, Characterization, and Optimization of a Solid Oxide Fuel Cell Microturbine System*, Graduated August 2015, Current Employer: CMU.
Parthib Rao, *A Higher-Order Thermal Lattice-Boltzmann Model*, Graduated May 2015, Current Employer: Rice University.
Lina Xu, *A New Moving Boundary Condition in Particulate Suspensions with the Lattice Boltzmann Method*, Graduated January 2015, Current Employer: Parsons.
Justin DeBlois, *Building Energy Modeling for Green Architecture and Intelligent Dashboard Applications*, Graduated December 2013, Current Employer: Setty.
Michael Ikeda, *A Novel Multiphase, Multicomponent, Thermal Lattice Boltzmann Model*, Graduated December 2012, Current Employer: United Technologies Research Center.
Yang Hu, *Advanced Exergy Analysis for a Solar Absorption Chiller*, Co-Advised with Volker Hartkopf, Graduated (from CMU) May 2012, Current Employer: Nexant.
Jie Bao, *Multicomponent and Multiphase Thermal Flow Characterization Using the Lattice-Boltzmann Method*, Graduated May 2010, Current Employer: Pacific Northwest National Lab.
Tony Kerzmann, *Linear Concentrating Photovoltaics Simulation and Analysis*, Graduated August 2010, Current Title: Associate Professor, Robert Morris University.
Veronica Miller, *Novel Hydrokinetic Power Generation: An Environmentally-Conscious Approach*, Graduated August 2010.
Florian Zink, *Identification and Attenuation of Losses in Thermoacoustics: Issues Arising in the Miniaturization of Thermoacoustic Devices*, Graduated December 2009, Current Employer: Audi.
Michael Guido, *Prediction of Heat Dissipation in 3-D Circuit Architecture*, Co-Directed with M. Lovell, Graduated December 2005, Current Employer: Mallett Technology, Inc.
Peng Yuan, *Numerical Characterization of Two-Phase, Two-Component Heat Transfer and Fluid Flow in Mesochannels*, Graduated December 2005, Current Employer: Westinghouse.
Yixin Lu, *Simulation and Analysis of a Flat Tube Type Solid Oxide Fuel Cell*, Graduated April 2005, Current Employer: Worleyparsons.

Post-Doctoral Researchers

Leitao Chen, February 2016 - Present.
Michael Whiston, August 2015 - January 2016, Current Employer: CMU.
Justin DeBlois, January 2014 - February 2014, Current Employer: Setty.
Michael Ikeda, January 2013 - August 2013, Current Employer: United Technologies Research Center.
Jie Bao, May 2010 - October 2010, Current Employer: Pacific Northwest National Laboratory.
Florian Zink, December 2009 - May 2010, Current Employer: Audi.

Mustafa Bayrak, January 2007 - December 2007, Current Title: Professor, Department of Mechanical Engineering, Niğde University, Turkey.

Yuksel Korkmaz, January 2003 - December 2004, Current Title: Associate Professor, Mechanical Engineering, Sakarya University, Turkey.

Pei-Wen Li, Co-Directed with M. K. Chyu, August 2001 - July 2006, Current Title: Professor, Aerospace and Mechanical Engineering Department, University of Arizona.

Visiting Scholars

Gon Kim, January 2011 - December 2011, Kyung Hee University, Republic of Korea.

M.S. Students

John Sun, August 2017 - Present.

Kevin Laux, *Visualizing Flow Regimes in a Small-Scale Heat Pipe*, Graduated Summer 2015.

Jonathan Hopkins, *A Tool for Evaluating Solar Insolation over Varying Locations and Time Periods*, Graduated Summer 2014.

Konstantin Tourkov, *Investigation of Thermoacoustic Performance of Standing and Traveling Wave Thermoacoustic Engines*, Graduated Summer 2013.

Qiuyan Li, *Dynamic Performance Analysis of H-Darrieus Working at Different Angles of Attack*, September 2012 - April 2013 (Professional M.S. Project).

Michael Ikeda, *Numerical Simulation of Vapor-Liquid Equilibria of a Water-Ethanol Mixture*, Graduated Spring 2011.

Wesley Knotts, *Investigation of Thermal Semiconductors for Adaptive Heat Management in Buildings*, Graduated Summer 2010 (Secondary Advisor; Primary Advisor - W. Clark).

Benjamin Leven, *Heat Exchangers for Compact Thermoacoustic Devices*, September 2007 - December 2008 (Left Program).

Raymond Brush, *Transient Thermal Property Evaluation During Cure of Substrate Materials*, Co-Directed with M. Lovell, Graduated August 2004.

Ph.D. Dissertation Committee Member

D. Tyler Landfried, *Characterization of the Behavior of Confined Laminar Jets*, Graduated Summer 2015.

Junqi Yuan, *Small Scale Free Surface Propulsion with Aid of Electrowetting*, Graduated Summer 2015.

Nina Baird, *Sustainable Mechanical Systems: Conditioning with Low-Grade Thermal Energy*, Graduated Spring 2015 (Carnegie-Mellon University).

Rongpeng Zhang, *Dynamic Optimization of Integrated Active-Passive Strategies for Building Enthalpy Control*, Graduated Spring 2014 (Carnegie-Mellon University).

Omer Karaguzel, *Simulation-Based Design Support for Building Systems Integrative Photovoltaics*, Graduated Fall 2013 (Carnegie-Mellon University).

Andrew Eastman, *Flow Enhancement and Analysis of Interactions with Piezoelectrically Oscillating Cantilevers*, Graduated Fall 2013.

William Collinge, *Indoor Environmental Quality in a Dynamic Life Cycle Assessment Framework for Whole Buildings*, Graduated Summer 2013.

Mehdi B. Nik, *VS-FMDF and EPVS-FMDF for Large Eddy Simulation of Turbulent Flows*, Graduated Fall 2012.

Sin Chien Siw, *Experimental Investigation of Internal Cooling Passages on Gas Turbine Blade with Pin-Fins and Rib-Turbulators*, Graduated Summer 2012.

Pavin Ganmol, *Heat Transfer in a Two-Pass Channel with Vortex Generators*, Graduated Fall 2010.

Sang-Kug Chung, *Micro Object Manipulation by Oscillating Bubbles*, Graduated Fall 2009.

- Shuping Chen, *Film Cooling Enhancement with Surface Restructure*, Graduated Fall 2008.
- Hee-Joon Lee, *Thermal-Fluids Design of Evaporative Micro-channel Systems*, Graduated Fall 2008 (Carnegie-Mellon University).
- Pushkarraj Deshmukh, *Design and Development of an Environmental Cell for Dynamic In Situ Observation of Gas-Solid Reactions at Elevated Temperatures*, Graduated Spring 2008.
- Roxana Cisloiu, *A Stabilized Mixed Finite Element Formulation for Finite Strain Deformation*, Graduated Spring 2006.
- Ayat Osman, *Life Cycle Optimization Model for Integrated Cogeneration and Energy Systems Applications in Buildings*, Graduated Spring 2006.
- Khaled Bataineh, *Development of Precision TEM Holder Assemblies for Use in Extreme Environments*, Graduated Fall 2005.
- James Cordle, *Modeling and Design of a Piezoelectric Microvalve for Pressurized Droplet Formation*, Graduated Fall 2005.
- Tomasz Drozda, *An Application of the Filtered Density Function Methods to Non-Premixed Diffusion Flames*, Graduated Summer 2005.
- Tao Zhang, *Design, Fabrication and Performance of a Miniaturized Polymer Electrolyte Fuel Cell (PEFC) System*, Graduated Spring 2005.
- Yosef Alyousef, *Management of Two-Phase Transport Phenomena Through Surface Structure and Wettability Control*, Graduated Spring 2005 (Carnegie-Mellon University).
- Junfeng Mei, *Formulation and Processing of Conductive Inks for Inkjet Printing of Electrical Circuits*, Graduated Fall 2004.
- Salil Desai, *Multiphysics Analysis and Optimization of 3 Dimensional Printing Technology Using Nano Fluidic Suspensions*, Graduated Summer 2004.
- Roy Issa, *Numerical Modeling of the Dynamics and Heat Transfer of Impacting Sprays for a Wide Range of Pressures*, Graduated Fall 2003.
- Osama Al-Aqal, *Heat Transfer Distributions on the Walls of a Narrow Channel with Jet Impingement and Cross Flow*, Graduated Summer 2003.
- Alan Briggs, *Transient Conjugate Heat Transfer in a Circular Duct for Power-Law Fluid with Viscous Dissipation*, Graduated Summer 2003.
- Ammata Tusnapuckdi, *Heat Transfer in Non-Newtonian Fluid Flow from an Oblique Array of Plates of Unequal Length*, Graduated Spring 2002.

M.S. Thesis Committee Member

- D. Tyler Landfried, *Characterization of the Behavior of Confined Laminar Jets*, Graduated Fall 2013.
- Andrew Eastman, *Heat Transfer and Flow Analysis of a Novel Low Flow Piezoelectric Air Pump*, Graduated Spring 2013.
- Timothy Ryan, *Design and Control of a Standing-Wave Thermoacoustic Refrigerator*, Graduated Fall 2009.
- Kyungjoo Ryu, *Micro Pumping and Particle Separation/Collection Using Oscillating Bubbles*, Graduated Summer 2008.
- Mahdi Mohebbi, *Large-eddy Simulation of NASA LaRC Coaxial He-O₂/Air Jet*, Graduated Summer 2007.
- Stephen Heston, *Linear Quadrupole Focusing for High Resolution Microdroplet-Based Fabrication*, Graduated Fall 2004.
- Ayat Osman, *Life Cycle Environmental Impact Analysis of Alternative Uses of Natural Gas-Fired Equipment in Buildings*, Graduated Fall 2002.

Undergraduate Research Assistants (36 URAs, including 11 women and 7 under-represented students; asterisk denotes students who subsequently enrolled in graduate school)

Tarushi Mittal, Graduating 2022; Melodi Delgadi, Graduating 2021; Eappen Nunnevali, Graduating 2020; Rebecca Nickonowicz, Graduating 2019; Andrew Gatherer*, Graduated 2018; Julie Fornaciari*, Graduated 2016; Ellen Moe, Graduated 2015; Christopher Cameron*, Graduated 2015; Jason Galletta, Graduated 2015; Nasir Sharaf, Graduated 2015; Kenechi Agbim*, Graduated 2014; Rachel Meyer*, Graduated 2014; Bill Buono, Graduated 2012; Ronald Brocovitch, Graduated 2012; Chenell York, Graduated 2013; Leonardo Moura*, Exchange Student from UNICAMP, Brazil; Konstantin Tourkov*, Graduated 2011; Paul Tunis, Graduated 2011; Nick Vukmer*, Graduated 2011; Michael Oyler, Graduated 2010; M. Brooke Sciarotta*, Graduated 2010; Brian Easter, Graduated 2009; Steve Lavoritano, Graduated 2009; Wesley Knotts*, Graduated 2008; Gerald diNoia, Graduated 2008; Eddie Halusic*, Graduated 2008; Todd Locker, Graduated 2007; Matt Paden*, Graduated 2007; Allen Patrick*, Graduated 2006; Donald McCalmon, Graduated 2005; Scott Butler, Graduated 2004; Misheka Wilson, Graduated 2004; Nick Krizan*, Graduated 2003; Brittany Guthrie*, Graduated 2002; Christopher Hardin*, Graduated 2002; Nathaniel Roberts*, Graduated 2001.

Undergraduate Design Projects

Rankine Cycle Simulator for Undergraduate Labs, J. Lee, N. Sepulveda, A. Morales, J. Saunders, 2018.

The Kuna Yala Rocket Stove, A. McCurdy, J. Bates, E. Matthews, and M. Sanders, 2013; J. Schneider and A. McCurdy, 2014.

Cooling of Electric Motors Using Heat Pipes, T. Banks, B. Counihan, A. Rieber, 2012.

Design of an Open Loop Brayton Cycle for Automobile Propulsion, A. DeRubeis, N. Duncun, A. Fregoso, Y. Xu, 2011.

Design and Fabrication of a Tesla Turbine, P. Tunis, G. Lindsay, K. Sanzo, N. Zwiryk, 2011.

Kingsley Association Experiment Station, C. Simpkins, P. Fanto, B. Taylor, and S. Pansino, 2010.

A Novel Method for the Production and Storage of Electric Power Through Rainfall, Senior Design Project, W. Epting, J. Ferrett, A. Chapman, and J. Brunner, 2009.

Solar Assisted Window Fan, MCSI Undergraduate Energy Efficiency Design Competition, P. Wetherill and S. Palmer, 2008-2009.

Water Distillation and Power Generation using Concentrating PV, Senior Design Project, D. Mirizio, A. Lindgren, and D. Berkepile, 2008.

Sustainable Redesign of Low-Income Housing, Summer Undergraduate Research Experience, S. Streiner, J. Pilz, and W. Koubaa, 2008.

Alternative Insulin Cooling for Portable Transport, Product Realization Design Project, N. Pireas, J. Cooke, D. Jacobs, and A. Rubinski, 2004.

Building Heat Flow and Water Usage Analysis and Optimization, Senior Design Project, B. Peters, S. Washington, J. Horner, and S. Griffin, 2003.

JackHeat: A Lightweight, Self-Heating Jacket, Product Realization Design Project, D. Chekan, M. Hoopes, and V. MacLaren, 2001-2002.

A Heated Headform for Hardhat Analysis and Design, Senior Design Project, H. DeBiase, C. Tucker, and S. McKinney, 2001.

PROFESSIONAL EXPERIENCE

Hertz Foundation Intern, Summer, 1994.

Undergraduate Summer Institute, Lawrence Livermore National Laboratory, Livermore, California.
Worked with a mentor to model a Xenon atom in a laser beam and attended lectures by Livermore scientists.

Martin Marietta Intern, June - August, 1993.

Education Division, National Air and Space Museum, Washington, D.C.

Designed and built a longitudinal wave device for *How Things Fly*, the museum's first interactive gallery (the device is still in use in the gallery).

CONSULTING EXPERIENCE

CryoTherm, Inc., *Fluid Property Matching for Optimized Cycle Operation*, Summer 2002.

ETAAC, Inc., *Phoenix Test Protocol Design*, Spring 2001.

PROFESSIONAL SERVICE

National:

Editorships

Editor-in-Chief, *Sustainable Energy Technologies and Assessments* (SETA), Elsevier, 2012 - 2019.

Associate Editor, *Journal of Heat Transfer* (JHT), ASME, 2015 - 2019.

Associate Editor, *Journal of Energy Resources Technology* (JERT), ASME, 2012 - 2015.

American Society of Mechanical Engineers:

Segment Leadership Team, Energy Conversion Segment, 2014 - 2016.

Executive Committee (Chair for 2012-2013), Advanced Energy Systems Division, 2005 - 2014.

Conference Chair, Energy Sustainability Conference, 2011 - 2012.

Technical Program Co-Chair, Energy Sustainability Conference, 2010 - 2011.

Media Editor, Advanced Energy Systems Division, 2002 - 2006.

Chair, Heat Pump Technical Committee, AESD, 2004 - 2006.

Vice-Chair, Heat Pump Technical Committee, AESD, 2002 - 2004.

Secretary, Heat Pump Technical Committee, AESD, 2000 - 2002.

Track Organizer, Energy Sessions, IMECE, 2006.

Topical Organizer, Heat Pump Technical Committee, AESD, IMECE, 2005 - 2013.

Topical Organizer, AJTEC 2011.

Session Chair, Heat Pump Technical Committee, AESD, IMECE, 1999 - 2014.

Session Chair, K-6: Heat Transfer in Energy Systems, Heat Transfer Division, 2004 - Present.

Member, K-6: Heat Transfer in Energy Systems, Heat Transfer Division, 2000 - Present.

American Society of Heating, Refrigerating, & Air-Conditioning Engineers:

Chair, TC 8.3 - Absorption and Heat Operated Machines, 2006 - 2008.

Vice-Chair, TC 8.3, 2004 - 2006.

Secretary, TC 8.3, 2002 - 2004.

Programs Chair, TC 8.3, 2002 - 2005.

Programs Chair, TC 1.1 - Thermodynamics and Psychrometrics, 2005 - 2014.

Chair, TC 1.1, 2003 - 2005.

Rice University:

Chair, Mechanical Engineering Department, 2015 - Present.

Magister, Wiess College, 2016 - Present.

Member, Provost's Committee, Molecular Nanotechnology Initiative, 2015 - 2018.

Member, Joint University Committee, Vision for the Second Century II, 2016 - 2018.

University of Pittsburgh:

Faculty Advisor, ASME, University of Pittsburgh Student Chapter, 2001 - 2015.

Faculty Counselor, SWE, University of Pittsburgh Student Chapter, 2004 - 2012.

Chair, Thermoscience Faculty Search Committee, MEMS Department, 2010 - 2011.

Member, Graduate Committee, MEMS Department, 2000 - 2003, 2004 - 2006, 2007 - 2015.

Member, Planning and Budgetary Committee, School of Engineering, 2004 - 2007.

Chair, Space Committee, MEMS Department, 2005 - 2007.

Chair, Ad hoc Interprogram Graduate Committee, MEMS Department, 2006 - 2007.

Member, Strategic Planning Committee, MEMS Department, 2006 - 2007.

Member, Faculty Search Committee, MEMS Department, 2002 - 2003, 2006 - 2015.

Member, Undergraduate Committee, Mechanical Engineering Department, 2003 - 2004.

Speaker, Mechanical Engineering Section, University of Pittsburgh Career Day, 2001 - 2003.

Chairman, Heat Transfer Preliminary Exam Committee, 2003, 2005, 2006, 2007.

Chairman, Fluids Preliminary Exam Committee, 2002 - 2003.

Member, Green Construction Committee, School of Engineering, 2001 - 2003.

Georgia Institute of Technology:

Chair, Georgia Tech Graduate Student Symposium, 1998.

Volunteer and Speaker, Society of Women Engineers High School Outreach Program, 1996 - 97.

PROFESSIONAL AFFILIATIONS

American Society of Mechanical Engineers, 1992 - Present.

Society of Women Engineers, 1992 - Present.

American Society of Heating, Refrigerating, & Air-Conditioning Engineers, 1995 - Present.

American Society for Engineering Education, 2000 - 2015.