

## SUMMARY

Thermal science expert with experience in all aspects of heat transfer and fluid mechanics. Produced approximately 350 publications, books, book chapters, conference presentations, and patents in areas including biological heat transfer and fluid flow, biomedical device design, energy, burn injuries, climate change, fundamental heat transfer and fluid mechanics, and manufacturing processes. Author of approximately 350 popular press articles and has been in more than 70 radio and television appearances

## APPOINTMENTS

*University of St. Thomas, St Paul, MN*

<b>Professor</b>	<b>2013-Present</b>
<b>Associate Professor</b>	<b>2008-2013</b>
<b>Assistant Professor</b>	<b>2002-2008</b>

## EDUCATION

*University of Minnesota - Twin Cities, Minneapolis, MN*

<b>Ph.D.</b> , Mechanical Engineering (Thermal Sciences)	<b>2002</b>
<b>M.S.</b> , Mechanical Engineering, GPA 3.96/4.00	<b>1999</b>
<b>B.S.</b> , Mechanical Engineering, GPA 4.00/4.00, <b>Minor</b> : Mathematics	<b>1997</b>

## PREVIOUS TEACHING EXPERIENCE

<b>Adjunct Faculty</b> , <i>University of St. Thomas, St Paul, MN</i>	<b>2000-2002</b>
<b>Graduate Teaching Fellow</b> , <i>University of Minnesota, Minneapolis, MN</i>	<b>2001-2002</b>
<b>Teaching Assistant</b> , <i>University of Minnesota, Minneapolis, MN</i>	<b>1997-2001</b>
<b>Tutor</b> , <i>University of Minnesota, Minneapolis, MN</i>	<b>1993-1997</b>

## HONORS/AWARDS

- National Center for Science Education Friend of the Planet Award (2016)
- University of St. Thomas Professor of the Year (2016)
- USA Green Deal of the Year business excellence award (2013)
- Composites Sustainability Award, American Composites Manufacturers Association Award for Composite Excellence, (2013)
- Nominated, George Mason University, Center for Climate Change Communication, Climate Change Communicator of the Year (2011)
- University of St. Thomas John Ireland Award (2009)
- University of St. Thomas Distinguished Educator Award (2008)
- University of St. Thomas Engineering Professor of the Year (2005)
- Graduate Teaching Fellowship (2001/2002)
- Institute of Technology Teaching Assistant of the Year, awarded by Institute of Technology Student Board, University of Minnesota (1999/2000)
- Institute of Technology Teaching Assistant of the Year, awarded by Institute of Technology Student Board, University of Minnesota (2000/2001)
- Institute of Technology Teaching Assistant of the Year, awarded by Institute of Technology Student Board, University of Minnesota (2001/2002)
- Mechanical Engineering Teaching Assistant of the Year, Mechanical Engineering Department, University of Minnesota (1998/1999)

- Minnesota Professional Engineers Foundation Orion Buan Memorial Scholarship (1996)
- Walter and Margaret Pierce Endowment Fund Scholarship (1996)
- National Space Grant Consortium Scholarship (1996)
- Frank Louk Scholarship (1996)
- Citizens' Scholarship (1992-1995)
- Alfred O. Neir Scholarship (1994)
- Dean's List (1993-1997)

### OTHER POSITIONS

**Climate Blogger – Guardian Newspaper**

**2013-2018**

### PUBLICATIONS

*(16 edited works, 3 books, 12 book chapters, 197 journal publications, 139 presentations, 6 granted patents, 5 patent applications, 2 granted trademarks)*

### Editing Activities

1. Editor, *Advances in Heat Transfer*, Vol. 53, Elsevier, (forthcoming, 2021).
2. Editor, *Advances in Heat Transfer*, Vol. 52, Elsevier, (in press).
3. Editor, *Advances in Heat Transfer*, Vol. 51, Elsevier, 2019.
4. Editor, *Advances in Heat Transfer*, Vol. 50, Elsevier, 2018.
5. Editor, *Advances in Heat Transfer*, Vol. 49, Elsevier, 2017.
6. Editor, *Advances in Heat Transfer*, Vol. 48, Elsevier, 2016.
7. Editor, *Advances in Heat Transfer*, Vol. 47, Elsevier, 2015.
8. Editor, *Advances in Heat Transfer*, Vol. 46, Elsevier, 2014.
9. Editor, *Advances in Numerical Heat Transfer Vol. 5: Numerical Models of Heat Exchangers*, Taylor and Francis, New York, 2017.
10. Editor, *Small-Scale Wind Power – Design, Analysis, and Economic Impacts*, Momentum Press, 2014.
11. Editor, *Advances in Heat Transfer*, Vol. 45, Elsevier, 2013.
12. Editor, *Advances in Heat Transfer*, Vol. 44, Elsevier, 2012.
13. Editor, *Advances in Numerical Heat Transfer Vol. 4: Nanoscale Heat Transfer and Fluid Flow*, Taylor and Francis, New York, 2012.
14. Guest Editor, *Advances in Numerical Heat Transfer Vol. 3: Numerical Implementation of Biological Models and Equations*, Taylor and Francis, New York, 2009.
15. Guest Editor, *Special Edition of the International Journal of Heat and Mass Transfer: Bioheat and Biofluid Flow*, Elsevier, Vol. 51, 23-24, November, 2008.
16. Assistant Editor, *Handbook of Numerical Heat Transfer*, 2<sup>nd</sup> Ed. Editors: Sparrow, Minkowycz, and Murthy, John-Wiley & Sons, Inc., New York, 2006.

### Editorial Board Member

1. International Society of Cardiovascular Translational Research, 2020-present
2. *Energies, Thermal Management*, 2019-present
3. *Cardiovascular Revascularization Medicine*, 2018-present
4. *Stem Cell Biology and Transplantation*, 2015-present
5. Associate Editor, National Center for Science Education, *Climate Science*, 2012-present

6. International Journal of Mechanics and Energy, 2012-present
7. Open Mechanical Engineering Journal, 2007-present
8. Open Mechanical Engineering Reviews, 2007-present
9. Open Mechanical Engineering Letters, 2007-present
10. Open Medical Devices Journal, 2008-present
11. Creative Engineering Journal, 2009-present
12. ISRN Applied Mathematics, 2011-present
13. International Journal of Sustainable Energy, 2012 - present
14. International Journal of Materials, Methods, and Technologies, 2012- present

**Books**

1. J.P. Abraham and B.D. Plourde, Small-Scale Wind Power – Design, Analysis, and Environmental Impacts, Momentum Press, 2014.
2. J.P. Abraham, P.S. Ellis, M.C. MacCracken, and G.M. Woodwell, Climate controversy 2013. New York, NY: AuthorHouse, 2013.
3. J.P. Abraham, E.M. Sparrow, W.J. Minkowycz, R.Ramazani-Rend, and J.C.K. Tong, All Fluid-Flow-Regimes Simulation Model for Internal Flows, Nova Science Publishers, Inc., Hauppauge, NY, 2011.

**Book Chapters**

1. J.M. Gorman, M. Regnier, and J.P. Abraham, Heat Exchange Between the Human Body and the Environment – A Comprehensive, Multi-Scale Numerical Simulation, in: *Advances in Heat Transfer* Vol. 52, 2020 (in press).
2. L.E. Olsen, J.P. Abraham, L.J. Cheng, J.M. Gorman, E.M. Sparrow, Summary of Forced-Convection Fluid Flow and Heat Transfer for Square Cylinders of Different Aspect Ratios Ranging from the Cube to a Two-Dimensional Cylinder, in: *Advances in Heat Transfer* Vol. 51, pp. 351-457, 2019.
3. E.M. Sparrow, J.M. Gorman, A. Ghosh, J.P. Abraham, Enhancement of Jet Impingement Heat Transfer by Means of Jet Axis Switching, in: *Advances in Heat Transfer*, Vol. 50, 2018.
4. E.M. Sparrow, J.M. Gorman, J.P. Abraham, W.J. Minkowycz, Validation of Turbulence Models for Numerical Simulation of Fluid Flow and Convective Heat Transfer, in: *Advances in Heat Transfer*, Vol. 49, 397-421, 2017.
5. J.M. Gorman, E.M. Sparrow, J.P. Abraham, W.J. Minkowycz, Heat Exchangers and Their Fan/Blower Partners Modeled as a Single Interacting System by Numerical Simulation, in: *Advances in Numerical Heat Transfer Vol. 5*, Taylor and Francis, New York, 2017.
6. J.P. Abraham, B.D. Plourde, L.J. Vallez, B.B. Nelson-Cheeseman, J.R. Stark, J.M. Gorman, E.M. Sparrow, Skin Burn, in: *Theory and Application of Heat Transfer in Humans*, edited by Devashish Shrivastava, Wiley, June 2018.

7. M.W. Dewhirst, J.P. Abraham, B.L. Viglianti, Evolution of Thermal Dosimetry for Application of Hyperthermia Treatment to Cancer, in: *Advances in Heat Transfer*, Vol. 47, 397-421, 2015.
8. B.D. Plourde, E.D. Taylor, P.O. Okaka, and J.P. Abraham, Financial and Implementation Considerations for Small-Scale Wind Power, in: *Small-Scale Wind Power – Design, Analysis, and Economic Impacts*, Momentum Press, 2014.
9. B.D. Plourde, E.D. Taylor, W.J. Minkowycz, and J.P. Abraham, Introduction to Small-Scale Wind Power, in: *Small-Scale Wind Power – Design, Analysis, and Economic Impacts*, Momentum Press, 2014.
10. J.P. Abraham, E.M. Sparrow, W.J. Minkowycz, R. Ramazani-Rend, and J.C.K. Tong, Modeling Internal Flows by an Extended Menter Transition Model, in: *Turbulence: Theory, Types, and Simulation*, Nova Publishers, New York, 2011.
11. S. Ramadhyani, J.P. Abraham, and E.M. Sparrow, A Mathematical Model to Predict Tissue Temperatures and Necrosis During Microwave Thermal Ablation of the Prostate, in: *Advances in Numerical Heat Transfer Vol. 3: Numerical Implementation of Bioheat Models and Equations*, Taylor and Francis, New York, 2009.
12. J.P. Abraham and E.M. Sparrow, Heat-Transfer and Temperature Results for a Moving Sheet Situated in a Moving Fluid, in: *Heat-Transfer Calculations, 2<sup>nd</sup> ed.*, editor, Myer Kutz, McGraw-Hill, 2005.

### **Publications**

1. G. Li, L. Cheng, J. Zhu, K.E. Trenberth, M.E. Mann and J.P. Abraham, Increasing Ocean Stratification Over the Past Half Century, *Nature Climate Change* (accepted).
2. F. Salamsi, J.P. Abraham, An Expert System for Determining Discharge Coefficients for Inclined Slide Gates Using Genetic Programming, *Journal of Irrigation and Drainage Engineering*, (accepted).
3. L. Cheng, K.E. Trenberth, N. Gruber, J.P. Abraham, J.T. Fasullo, G. Li, M.E. Mann, Z. Zhao, and J. Zhu, Improved Estimates of Changes in Upper Ocean Salinity and the Hydrological Cycle, *Journal of Climate* (accepted).
4. R. Daneshfaraz, R. Norouzi, M. Macedi, A. Bazayar, and J.P. Abraham, Laboratory Study of Energy dissipation in Inclined Drops with a Screen, *Journal of Applied Water Engineering and Research*, (accepted).
5. F. Zalamsi, R. Norouzi, J.P. Abraham, B. Nourani, S. Samadi, Effect of Inclined Clay Core on Embankment Dam Seepage and Stability Through LEM and FEM, *Geotechnical and Geological Engineering*, (in press), doi: 10.1007/s10706-020-01455-7.

6. A. Ghaderi, R. Daneshfaraz, S. Abbasi, and J.P. Abraham, Numerical Analysis of the Hydraulic Characteristics of Modified Labyrinth Weirs, *International Journal of Energy and Water Resources*, doi: 10.1007/s42108-00082-5, (in press).
7. J.P. Abraham, B. D. Plourde, and L. Cheng, Using Heat to Kill SARS-CoV-2, *Reviews in Medical Virology*, (in press), 2020.
8. A. Ghaderi, M. Shokri, J.P. Abraham, Estimation of Actual Evapotranspiration Using Remote Sensing Method and SEBAL Algorithm- A Case Study: Ein Khosh Plain, Iran, *Hydrology*, (in press).
9. A. Ghaderi, R. Daneshfaraz, M. Torabi, J.P. Abraham, and H.M. Azamathulla, Experimental Investigation on Effecting Scouring Parameters Downstream from Stepped Spillways, *Water Supply* (accepted).
10. F. Salamsi, and J.P. Abraham, Predicting Seepage from Unlined Earthen Channels Using the Finite Element Method and Multi Variable Nonlinear Regression, *Agricultural Water Management*, Volume 234, Paper no. 106148, 2020.
11. A. Ghaderi, M. Dasineh, R. Daneshfaraz, and J.P. Abraham, Reply to the Discussion on Paper: 3-D Numerical Simulation of Water Flow over a Broad Crested weir with Openings by Daneshfaraz et al 2019, *ISH Journal of Hydraulic Engineering*, (in press).
12. A. Ghaderi, R. Daneshfaraz, J.P. Abraham, and M. Torabi, Effect of Different Channels on Discharge Coefficient of Labyrinth Weirs, *Teknik Dergi*, (in press).
13. F. Salamsi, B. Naourani, and J.P. Abraham, Investigation of the Effect of Different Configurations of Double-Cutoff Walls Beneath Hydraulic Structures on Uplift Forces and Exit Hydraulic Gradients, *Journal of Hydrology*, vol. 586, doi: 10.1016/j.hydro.2020.123858, 2020.
14. A. Ghaderi, S. Abbasi, J.P. Abraham, H. M. Azamathulla, Efficiency of Trapezoidal Labyrinth Shaped Stepped Spillways, *Flow Measurement and Instrumentation*, paper no. 101711, 2020, doi: 10.1016/j.flowmeasinst.2020.101711.
15. L. Cheng, J.P. Abraham, J. Zhu, K.E. Trenberth, J. Fasullo, T. Boyer, R. Locarnini, B. Zhang, F. Yu, L. Wan, X. Chen, X. Song, Y. Liu, and M.E. Mann, Record-Setting Ocean Warmth Continued in 2019, *Advances in Atmospheric Sciences*, Vol. 37, 1-6, 2020.

16. F. Salamsi, and J.P. Abraham, Discussion of “Hydrodynamics of Rectangular Broad-Crested Porous Weirs” by Akbar Safarzadeh and Seyed Hossein Mohajeri, *J. Irrig. Drain. Eng.* Vol. 146, paper no. 07020004, 2020.
17. R. Daneshfaraz, M.M. Asl, S. Razmi, R. Norouzi, and J.P. Abraham, Experimental Investigation of the Effect of Dual Horizontal Screens on the Hydraulic Performance of a Vertical Drop, *International Journal of Environmental Science and Technology*, Vol. 17, pp. 2927-2937, 2020.
18. J.M. Gorman, et al., Memoriam, Ephraim Sparrow, *International Journal of Heat and Mass Transfer*, Vol. 148, article no. 18755, 2020.
19. F. Salmasi, J.P. Abraham, Discharge coefficients for ogee weirs including the effects of a sloping upstream face, *Water Science and Engineering*, doi: 10.2166/ws.2020.064, 2020.
20. F. Salamsi, and Abraham J.P., Discussion of “Hydrodynamics of Retangular Broad-Crested Porous Weirs” by Akbar Safrazadeh and Seyed Moharjeri, *Journal of Irrigation and Drainage Engineering*, Vol. 146, doi: 10.1061/%28ASCE%29IR.1943-4774.0001450, 2020.
21. R. Daneshfaraz, O. Minaeri, J.P. Abraham, and S. Dadashi, 3-D Numerical Simulation of Flow Over a Broad-Crested Weir with Opening, *Journal of Hydraulic Engineering*, Vol. 24, doi: 10.1080/09715010.1581098, 2020.
22. A. Ghaderi, M. Dasineh, S. Abbasi, and J.P. Abraham, Investigation of Trapezoidal Sharp-Crested Weir Discharge Coefficients Under Subcritical Flow Regimes, *Applied Water Science*, Vol. 10, article no. 31, 2019.
23. G. Li, Y. Zhang, J. Xiao, J.P. Abraham, L. Cheng, and J. Zhu, Examining the Salinity change in the upper Pacific Ocean During the Argo Period, *Climate Dynamics* Vol. 53, pp. 6055-6074, 2019.
24. J.P. Abraham, K. Diller, A Review of Hot Beverages – Satisfying Consumer Preferences and Safety, *J. Food Science*, Vol. 84, pp. 2011-2014, 2019.
25. J.M. Gorman, et al., In Memoriam, Ephraim M. Sparrow (May 27, 1928 – August 1, 2019), *Numerical Heat Transfer Part A*, Vol. 76, pp. 181-184, 2019.
26. F. Jafari, F. Salamsi, and J.P. Abraham, Numerical Investigation of Granular Filer Under the Bed of a Canal, *Applied Water Science*, Vol. 9, Article no. 137, 2019
27. J. P. Abraham, Heat risks associated with synthetic fields, *International Journal of Hyperthermia*, Vol. 24, pp. 516-517, 2019.

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28. T. Wei and J.P. Abraham, Heat transfer regimes in fully developed circular tube flows, a map of flow regimes, *International Communications in Heat and Mass Transfer*, Vol. 104, 147-152, 2019.
  29. B.D. Plourde, A. Gikling, T. Marsh, M.A. Riemenschneider, J.L. Fitzgerald, W.J. Minkowycz, J. Kiplagat, J.P. Abraham, Design and Evaluation of a Concentrated Solar-Powered Thermal-Pasteurization System, *Journal of Solar Energy Research*, Vol. 6, pp. 34-42, 2019.
  30. E. Dodangeh, K. Shahedi, K. Solalani, J.T., Shiu, J.P. Abraham, Data-based bivariate uncertainty assessment of extreme rainfall-runoff using copulas: Comparison between annual maximum series (AMS) and peaks over threshold (POT), *Environmental Monitoring and Assessment*, Vol. 191:67, 2019.
  31. F. Salamsi, M. Nouri, and J.P. Abraham, Laboratory Study of the Effect of Sills on Radial Gate Discharge Coefficient, *KSCE Journal of Civil Engineering*, Vol. 23, pp. 2117-2125, 2019.
  32. Benoit et al., Measuring Global Ocean Heat Content to Estimate the Earth Energy Imbalance, *Frontiers in Marine Science, OceanObs '19: An Ocean of Opportunity*, Vol. 6, doi: 10.3389/fmars.2019.00432, 2019.
  33. L. Cheng, J. Zhu, J.P. Abraham, K. E. Trenberth, J. T. Fasullo, B. Zhang, F. Yu, L. Wan, Z. Chen, X. Song, 2018 Continues record global warming, *Advances in Atmospheric Sciences*, 36, pp. 249-252, 2019.
  34. L.Cheng, G. Wang, J.P. Abraham, G. Huang, Decadal ocean heat redistribution since the late 1990s and its association with key climate modes, *Climate*, Vol. 6, 91, 2019.
  35. G. Wang, L Cheng, C. Li, A. Storto, H. Liu, J. Chen, and J.P. Abraham, Synthetic Profile Dataset for Evaluating Uncertainty of Ocean Heat Content Estimate, *J. Institute for Atmospheric Physics*, (**submitted**).
  36. L. Cheng, J.P. Abraham, Z. Hausfather, and K.E. Trenberth, How fast are the oceans warming?, *Science*, Vol. 363, pp. 128-129, 2019.
  37. G. Wang, L. Cheng, A. Storto, H. Liu, and J.P. Abraham, Quantifying the Capability of Ocean Observation System in Representing Ocean Heat Changes Using Synthetic Observation, *Journal of Climate*, (**submitted**).
  38. J.P. Abraham, E.M. Sparrow, J.M. Gorman, Y. Zhao, and W.J. Minkowycz, Application of an Intermittency Model for Laminar, Transitional, and Turbulent Internal Flows, *Journal of Fluids Engineering*, Vol. 141, paper no. 071204, 2019.

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39. J.P. Abraham, J. R. Stark, J.M. Gorman, E. M. Sparrow, W.J. Minkowycz, Tissue Burns Due to Contact Between a Skin Surface and Highly Conducting Metallic Media in the Presence of Inter-Tissue Boiling, *Burns*, Vol. 45, pp. 369-378, 2019.
  40. J.M. Gorman, E. M. Sparrow, C.J. Smith, A. Ghosh, J.P. Abraham, R. Daneshfaraz, A. Rezazadeh Joudi, In-bend pressure drop and post-bend heat transfer for a bend with a partial blockage at its inlet, *Numerical Heat Transfer A*, Vol. 73, pp. 743-767, 2018.
  41. A. Bahro, Z. Igyarto, C. Williams, J.P. Abraham, and B.J. Martinsen, Treatment of Critical Hand Schemia via Orbital Atherectomy and Focal Force Balloon Angioplasty: A Mini-Review, *Cardiovascular Revascularization Medicine*, Vol. 20, pp. 248-253, 2019.
  42. J.P. Abraham, R. Maki, Hydrodynamics of Laminar Flow Through Dimpled Pipes, *MOJ Civil Engineering*, Vol. 4, pp. 150-154, 2018.
  43. L. Cheng, H. Luo, T. Boyer, R. Cowley, J. Abraham, V. Gouretski, F. Reseghetti, and J. Zhu, How Well Can We Correct Systematic Errors in Historical XBT Data? *Journal of Atmospheric and Oceanic Technology*, Vol. 35, pp. 1103-1125, 2018.
  44. G. Wang, L. Cheng, J.P. Abraham, C. Li, Consensuses and Discrepancies of basin-scale ocean heat content changes in different ocean analyses, *Climate Dynamics*, Vol. 50, pp. 2471-2487, 2018
  45. M. T. Sattari, H. Feyzi, and J.P. Abraham, Comparing the Performance of Genetic and Differential Evolution Algorithms in Optimum Operation of Reservoir While Considering the Minimum Environmental Demand, *Stochastic Environmental Research and Risk Assessment (SERR)*, (submitted).
  46. R. Daneshfaraz, A.R. Joudi, J.P. Abraham, Numerical Investigation on the Effect of Sudden Contraction on Flow Behavior in a 90-Degree Bend, *Korean Journal of Civil Engineering*, Vol. 22, pp 603-612, 2018.
  47. M. T. Sattari, A. Farkhondeh, and J.P. Abraham, Estimation of Sodium Adsorption Ratio Indicator Using Data Mining Methods: A Case Study in Urmia Lake Basin, Iran, *Environmental Science and Pollution Research*, Vol. 25, pp. 4776-4786, 2018.
  48. M.T. Sattari, R. Misabbasi, R. S. Sushab, and J.P. Abraham, Prediction of Groundwater Level in the Ardebil Plain Using Support Vector Regression and the M5 Tree Model, *Groundwater Journal*, Vol. 56, pp. 636-646, 2018.



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49. L. Cheng, K.E. Trenberth, J. T. Fasullo, J.P. Abraham, T.L. Boyer, K. von Schuckmann, and J. Zhu, Taking the Pulse of the Planet, *EOS*, Vol. 98, pp 14-15, 2018.
  50. J.P. Abraham, B.D Plourde, L. J. Vallez, Comprehensive review and study of buoyant air flow within positive-pressure hospital operating rooms, *Numerical Heat Transfer A*, Vol. 72, pp. 1-20, 2018.
  51. M.R. Sattari, M. Pal, R. Mirabbasi, and J.P. Abraham, Ensemble of M5 Model Tree Based Modelling of Sodium Adsorption Ratio, *Journal of Artificial Intelligence and Data Mining*, Vol. 6, pp. 69-78, 2018.
  52. M.R. Sattari, Dodangeh, and J.P. Abraham, Estimation of Daily Soil Temperature Via Data Mining Techniques in Semi-Arid Climate Conditions, *Earth Sciences Research Journal*, Vol. 21, pp. 85-93, 2017.
  53. J.P. Abraham, L. Cheng, M.E. Mann, Future Climate Projections Allow Engineering Planning, *Forensic Engineering*, Vol. 170, pp. 54-57, 2017.
  54. B.D. Plourde, L.J. Vallez, B. B. Nelson-Cheeseman, J.P. Abraham, Transcutaneous Recharge: A Comparison of Numerical Simulation to In Vivo Experiments *Neuromodulation*, Vol. 20, pp. 613-621, 2017.
  55. E.M. Sparrow, B.B Nelson-Cheeseman, W.J. Minkowycz, J.M. Gorman, and J.P. Abraham, Use of Multi-Lumen Catheters to Preserve Injected Stem Cell Viability and Injection Dispersion, *Cardiovascular Revascularization Medicine*, Vol. 18, pp. S49-S57, 2017.
  56. L.J. Vallez, B.D. Plourde, J.E. Wentz, B. B. Nelson-Cheeseman, J.P. Abraham, A Review of Scald Burn Injuries, *Internal Medicine Review*, Vol. 3, pp. 1-18, 2017.
  57. R. Daneshfaraz, H. Sadeghi, A. R. Joudi, J.P. Abraham, Experimental Investigation of Hydraulic Jump Characteristics in Contractions and Expansions, *Sigma Journal of Engineering and Natural Sciences*, Vol. 35, pp. 87-98, 2017.
  58. R. Daneshfaraz, A. R. Joudi, A. Ghaderi, J.P. Abraham, Comparisons of CFD Simulations with Physical Models of Dam Spillway Flow (Case Study: Azad Dam Spillway, Iran), *Journal of Dams and Reservoirs*, (accepted).
  59. L.J. Cheng, K.E. Trenberth, T. Boyer, J. T. Fasullo, L. Zhu, J.P. Abraham, Improved Estimates of Ocean Heat Content from 1960-2015, *Science Advances*, Vol. 4, paper no. e1601545, 2017.
  60. J.M. Gorman, E., M. Sparrow, J.P. Abraham, W.J. Minkowycz, Heat Transfer Design Methodology Treating a Heat Exchanger Device and its Fluid-Mover

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- Partner as a Single System, *Heat Transfer Engineering*, Vol. 38, pp. 841-852, 2017.
61. R.T. Bourdon, B.B. Nelson-Cheeseman, and J.P. Abraham, Review on the Treatment and Avoidance of Scald Injuries, *World Journal of Dermatology*, Vol. 6, pp. 17-26, 2017.
  62. B.D. Plourde, J.R. Stark, J. P. Abraham, A New Catheter Technology to Deliver Vascular Stem-Cells, *Global Journal of Stem Cell Biology and Transplantation*, Vol. 2, pp. 7-16, 2016.
  63. J.R. Stark, S.R. Romero, J.M. Gorman, J.P. Abraham, E.M. Sparrow, Modulated-Power Implantable Neuromodulation Devices and Their Impact on Surrounding Tissue Temperatures, *Journal of Biomedical Science and Engineering*, Vol. 9, pp. 545-562, 2016.
  64. L. Cheng, K.E. Trenberth, M.D. Palmer, J. Zhu, and J.P. Abraham Observed and Simulated Full-Depth Ocean Heat Content Changes for 1970-2005, *Ocean Sciences*, Vol. 12, pp. 925-935, 2016.
  65. J.M. Gorman, E.M. Sparrow, J.P. Abraham, W. J. Minkowycz, Evaluation of the Efficacy of Turbulence Models for Swirling Flows and Effect of Turbulence Intensity on Heat Transfer, *Numerical Heat Transfer B*, Vol. 70, pp. 485-502, 2016.
  66. J.P. Abraham, B.B. Nelson Cheeseman, E. M. Sparrow, J.E. Wentz, J.M. Gorman, S. E. Wolf, Comprehensive Method to Predict and Quantify Scald Burns from Beverage Spills, *Int. J. Hyperthermia*, Vol. 32, pp. 900-910, 2016.
  67. B.D. Plourde, L.J. Vallez, B. Sun, B.B. Nelson-Cheeseman, J.P. Abraham, Alterations of Blood Flow Through Arteries Following Atherectomy and the Impact on Pressure Variation and Velocity, *Cardiovascular Engineering and Technology*, Vol. 7, pp. 280-289, 2016.
  68. N.K. Langat, T. Thorusa, J.P. Abraham, J. Wanyoko, Performance of an Improved Fluidized System for Processing Green Tea, *World Academy of Science Engineering and Technology*, Vol. 10, 1045-1050, 2016.
  69. L. Cheng, J. Abraham, G. Goni, T. Boyer, S. Wijffels, R. Cowley, V. Gouretski, F. Reseghetti, S. Kizu, S. Dong, F. Bringas, M. Goes, L. Houpert, J. Sprintall, and J. Zhu, XBT Science: Assessment of XBT Biases and Errors, *Bulletin of the American Meteorological Society*, June, pp. 924-933, 2016.
  70. J.P. Abraham, R. Cowley, L. Cheng, Quantification of the Effect of Water Temperature on the Fall Rate of expendable BathyThermographs, *Journal of Atmospheric and Oceanic Technology*, Vol. 6, pp. 1271-1284, 2016.

71. R.T. Bourdon, B.B. Nelson-Cheeseman, and J.P. Abraham, Prediction, Identification, and Initial Treatment Guidelines for Scald Injuries, *Austin Journal of Emergency and Critical Care Medicine, Special Issue on Burns*, Vol. 3, pp. 1043-1049, 2016.
72. J.C.K. Tong, J.P. Abraham, J.M.Y. Tse, W.J. Minkowycz, and E.M. Sparrow, New Archive of Heat Transfer Coefficients from Square and Chamfered Cylinders in Crossflow, *International Journal of Thermal Sciences*, Vol. 105, pp. 218-223, 2016.
73. L. Cheng, K.E. Trenberth, M.D. Palmer, J. Zhu, and J.P. Abraham, Observed and Modeled Ocean Heat Content Changes Since 1970, *Ocean Sciences*, Vol 12, pp. 925-936, 2016.
74. R. Daneshfaraz, A. Ghahramanzadeh, A. Ghaderi, A. Rezazadeh Joudi, and J.P. Abraham, Investigation of the Effect of Edge Shape on Characteristics of Flow Under Vertical Gates, *Journal AWWA*, Vol. 8, pp. E425-432, 2016.
75. J.P. Abraham, B.D. Plourde, L.J. Vallez, and B.B. Nelson-Cheeseman, Correcting a Prevalent Misunderstanding of Burns, *Burns*, Vol. 42, pp. 715-716, 2016.
76. J. P. Abraham and B.D. Plourde, Validation of Numerically Simulated Tissue Temperatures During Transcutaneous Recharge of Neurostimulation Systems, *Journal of Neuromodulation*, Vol. 19, pp. 161-170. 2016.
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**Conference Presentations and Public Lectures**

1. J.P. Abraham, Advanced Methods in Thermal Engineering, *International Workshop on Recent Advances in Thermal Engineering*, India, June 29-July 3, 2020.
2. J.P. Abraham, L. Cheng, Kevin Trenberth – A Life of Research and Impact, *Trenberth Symposium*, Denver, CO, March 16, 2020.
3. J.P. Abraham, Modern Climate Change, *Threats to the Worlds Oceans – World Ocean Day*, Minneapolis, MN June 8, 2020.
4. L. Cheng, K.E. Trenberth, N. Gruber, M.E. Mann, J.P. Abraham, J. Fasullo, G. Li, X. Zaho, and J. Zhu, Ocean Subsurface Salinity Changes Yield an Anthropogenic Climate Change Signal, *Ocean Sciences 2020*, San Diego, CA, February 16-21, 2020.
5. J.P. Abraham, Climate Science, Projections for the Next Two Decades, *Code Blue, Health Care Professionals for a Healthy Climate*, Minneapolis, MN, April 4, 2020.
6. L. Cheng, G. Foster, Z. Hausfather, K.E. Trenberth, J.P. Abraham, Increase in the Rate of Ocean Warming, *2019 AGU Fall Meeting*, San Francisco, December, 9-13, 2019.
7. J.P. Abraham, G. Foster, Z. Hausfather, L. Cheng, K.E. Trenberth, Earth's Energy Imbalance and Energy Flows Through the Climate System, *2019 AGU Fall Meeting*, San Francisco, December, 9-13, 2019.
8. L. E. Olsen and J.P. Abraham, Evaluation of CFD algorithms for solving a canonical problem of flow over a square cylinder, *4<sup>th</sup> Thermal and Fluids Engineering Conference*, Las Vegas, April 14-17, 2019.
9. S. A. Mandia, J.P. Abraham, M. Ashley, and J.W. Dash, The Climate Rapid Response Team – An Effective Model for Engaging Media and Policymakers, *2018 AGU Fall Meeting*, Washington, DC, December 2018.
10. J.P. Abraham, Climate Change, the Evidence is in the Oceans, *Presented at the National Laboratory for Marine Science and Technology*, Qingdao, China, October 25, 2018.
11. J.P. Abraham, Progress in XBT simulations, *Presented at the Institute of Atmospheric Physics*, Beijing, October 23, 2018.
12. J.P. Abraham, B.D. Plourde, J.R. Stark, Modeling Hemodynamics Through Lesions *Cardiovascular Research Technologies Conference 18*, Washington DC., March 3-6, 2018.

13. G. Wang, L. Cheng, J.P. Abraham, C. Li, and H. Du, Consensuses and discrepancies of basin-scale ocean heat content changes in different ocean analysis, *AOGS 15<sup>th</sup> Annual Meeting*, June 3-8, Hawaii, USA, 2018.
14. K.E. Trenberth, C. Lijing, P. Jacobs, and J.P. Abraham, Are recent hurricane (Harvey, Irma, and Maria) disasters Natural? *AGU Fall 2017 Meeting*, New Orleans, December 11-15, 2017.
15. P. Jacobs, S. Akella, K.E. Trenberth, C. Lijing, and J.P. Abraham, The Historical Context of the 2017 Hurricane Season's Ocean Warmth, *AGU Fall 2017 Meeting*, New Orleans, December 11-15, 2017.
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17. J.P. Abraham and B.D. Plourde, Using ANSYS for Multiphysics Design of a Water Treatment System, *ANSYS Innovation Conference 2017*, Minneapolis, MN, November 8, 2017.
18. J.P. Abraham, L.J. Cheng, K.E. Trenberth, Improved Estimates of Ocean Heat Content from 1960-2015, *NOAA Presentation*, Washington DC, June 22, 2017.
19. J.P. Abraham, Use of Computational Fluid Dynamics to Improve Oceanographic Measurements, *NOAA Presentation*, Washington DC, January 12, 2017.
20. J.P. Abraham, B.D. Plourde, Use of Multi-lumen Catheters to Preserve Injected Stem Cell Viability, *Cardiovascular Research Technologies Conference 17*, Washington DC., February 18-21, 2017.
21. L. Cheng, J. Zhu, K. Trenberth, J. Fasullo, M. Palmer, T. Boyer, J. Abraham, Improved Ocean Heat Content Estimation Since 1960, *AGU Fall Meeting 2016*, San Francisco, CA, 2016.
22. J.P. Abraham, B. D. Plourde, John Stark, L.J. Vallez, Using ANSYS to Reduce Costs and Speed Development Process, *ANSYS Upper Midwest Innovation Conference*, Bloomington, Minnesota, November 17, 2016 (Keynote).
23. N. Langat, T. Thoruwa, J. Abraham, J. Wanyoko, Performance of an Improved Fluidized System for Processing Green Tea, *ICEE 18<sup>th</sup> International Conference on Energy Engineering*, Toronto, Canada, 2016.
24. L. Cheng, R. Cowley, J.P. Abraham, Cold Water Biases in XBT Descent, *5<sup>th</sup> XBT Science Workshop*, Tokyo, Japan, October 3-7, 2016 (Invited).



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25. L. Cheng, K. Trenberth, M. Palmer, J.P. Abraham, Historical Ocean Heat Content Estimation and the Implications for Assessing Historical Earth's Energy Budget, *Clivar 2016*, Qingdao, China, 2016.
  26. R. Cowley, J.P. Abraham, L. Cheng, The Effect of Water Temperature on XBT Fall Rate, *Clivar Third IQuOD Workshop*, Hamburg, Germany, December 3-4, 2015.
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  30. L.Cheng, J. Zhu, J.P. Abraham, An Updated Historical (1970-2014) Upper OHC Estimates and Implication for the Global Energy Budget, *Climate and Ocean Variability and Change (CLIVAR) 8<sup>th</sup> Session of the Global Synthesis*, Exeter, UK, September 28, 2015.
  31. J.P. Abraham, Our Changing Climate, *Citizens Climate Lobby Conference*, Red Wing, MN, November 6, 2015.
  32. J.P. Abraham, J.R. Stark, Advances in XBT Measurement and Bias Reduction, *Chinese Academy of Sciences*, Beijing, October 10, 2015.
  33. G. Foster and J.P. Abraham, Lack of Evidence for a Slowdown in Global Temperature, *American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18, 2015.
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  36. J.P. Abraham, Small-scale Wind Turbines: Design, Analysis and Applications, *Hong Kong University*, January 28, 2015 (invited).

37. J.P. Abraham, The Science of Climate Change, What Do We Really Know, *Hong Kong University of Science and Technology*, January 26, 2015 (invited).
38. J.P. Abraham et al., A Novel Multi Lumen Compliant Balloon Catheter (ND<sup>®</sup> Infusion Catheter) Preserves Stem Cell Viability and Improves Dispersion When Compared to a Standard Single Lumen Balloon Angioplasty Catheter, *European Society of Cardiology*, 2015, (submitted).
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40. J.P. Abraham, B.D. Plourde, S.A. Mandia, and K.E. Trenberth, Closing the Earth Energy Imbalance, *3<sup>rd</sup> International Conference on Earth Science and Climate Change*, San Francisco, CA, July 28-30, 2014.
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42. J.P. Abraham, B.D. Plourde, J.R. Stark, W.J. Minkowycz, Cryosurgical Treatment of Cancer: The Importance of Modeling, *4<sup>th</sup> World Congress on Cancer Science and Therapy*, Chicago, October 20-22, 2014.
43. N. Dib, J.P. Abraham, B. D. Plourde, D.B. Schwalbach, D. Dana, L. Myers, K. Hunkler, T. Flower, and R.E. Kohler, A Novel Multi-lumen Compliant Balloon Catheter Preserves Stem Cell Viability and Decreases Cellular Clumping When Compared to a Standard Single-lumen Balloon Angioplasty Catheter, *Transcatheter Cardiovascular Therapeutics (TCT 2014)*, Washington, DC, September 13-17, 2014.
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45. J.P. Abraham, The Science of Climate Change (Keynote), *2014 Summer Institute for Climate Change and Energy Education*, Sandstone, MN, August 4-6, 2014.
46. J.P. Abraham, D. B. Schwalbach, T. M. Shepard, J. M. Gorman, Calculating forces of impact as objects travel from air into water at high velocity, *ANSYS Regional Conference*, Minneapolis, MN, June 10, 2014.

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47. B.D. Plourde, D.B. Schwalbach, J.P. Abraham, R.E. Kohler, and N.N. Johnson, Intracoronary Injection of Medication from multi-lumen injection Catheters, *Design of Medical Devices 2014*, April 7-14, Minneapolis, MN.
  48. N. Dib, J. Abraham, B.D. Plourde, D.S. Schwalbach, D. Dana, D. Lester, T. Flowers, and R.E. Kohler, Comparison of the Stem Cell Viability and Shear Stress of Single Lumen and Multi Lumen Balloon Infusion Catheter for Intra-Arterial Stem Cell Infusion, *American Cardiology Conference 2014*, Washington, DC, March 29-31.
  49. J.P. Abraham, The Science of Global Warming, What Do We Really Know (Keynote), *Audubon Society National Meeting*, October 6, 2013.
  50. J.P. Abraham, Thawing Out Climate Science, IEEE 2013 Awards Banquet, St. Paul, MN, February 23, 2013.
  51. J.P. Abraham, Using ANSYS to Model Rotating Oceanographic Devices, *ANSYS Regional Conference*, Minneapolis, June 6, 2013.
  52. N. Dib, J.P. Abraham, B. Plourde, D. Schwalbach, D. Dana, L. Myers, T. Flowers, and R. Kohler, Stem Cell Viability Significantly Reduced After Passing Through a Standard Single Lumen Over-the-wire 0.014 inch Balloon Angioplasty Catheter, *TCT 2013 Conference*, October 27-November 1, 2013, San Francisco, CA.
  53. J.P. Abraham, Measurements of the Earth's Climate System, *IEEE Conference on Instrumentation and Measurement Technology Conference*, Minneapolis, MN, May 6, 2013.
  54. J.P. Abraham, Numerical Simulations of Drug Deposition of Paclitaxel, *Design of Medical Devices Conference*, 2013, Minneapolis, MN, April 8-11, 2013.
  55. J.P. Abraham, J. Stark, J. Gorman, E. Sparrow, R. Kohler, A Model of Drug Deposition Within Artery Walls, *Design of Medical Devices Conference*, 2013, Minneapolis, MN, April 8-11, 2013.
  56. J.L. Conroy, S.A. Mandia, J.P. Abraham, S.E. Moffitt, G. Tootle, Environmental Litigation and the Role of Climate Scientists, *AGU Winter Meeting 2012*, December 3-7, San Francisco, 2012.
  57. S.A. Mandia, J. Abraham, J. Dash, M. Ashley, Filling the Knowledge Gap that Exists Between the Public and Its Leaders and Climate Science Experts, *AGU Winter Meeting 2012*, December 3-7, San Francisco, 2012.
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59. M.J. Kallock, A. Yevzlin, M. Nelson, and J.P. Abraham, Numerical Modeling of Blood Flow in a New Percutaneously Delivered Hemodialysis Shunt, *BMES 2012 Annual Meeting*, Atlanta Georgia, October 24-27, 2012.
  60. J.P. Abraham, Understanding Climate Change's Common Myths, *Minnesota Broadcast Meteorologists Climate Change Science Seminar*, St. Paul, MN, October 5-6, 2012.
  61. N.P. Sullivan, J.E. Wentz, J.P. Abraham, Multi-Scale Modeling of Tubular Cross-Flow Microfiltration of Metalworking Fluids, *ASME International Mechanical Engineering Congress and Exposition*, Houston, TX, November 9-15, 2012.
  62. J.P. Abraham, M. Nelson, J. Jeske, J. Gorman, Simulation Tools for Design and Testing Substitution in Medical Devices, *Lifescience Alley Research Conference, Research and Development 101*, Minneapolis, MN, May 22, 2012.
  63. M.J. Kallock, M. E. Nelson, J. P. Abraham, and A. S. Yevzlin, Fluid Mechanic Modeling of a Percutaneously Delivered Vascular Access Device, *American Society of Diagnostic and Interventional Nephrology, 8th Annual Meeting*, New Orleans, LA, February 24-26, 2012.
  64. D. Dana, J.P. Abraham, R. Kohler, A. Campbell, B. Baird, M. Olson, and N. Dib, A Novel Catheter Delivery System (CardioDib) That May Enable Intracoronary Stem Cell Infusion by Possibly Minimizing Cellular Clumping and Distal Embolization (DE) While Preserving Cellular Viability, *9<sup>th</sup> International Symposium on Stem Cell Therapy and Cardiovascular Innovations*, Madrid, Spain, June 7-8, 2012.
  65. K.E. Trenberth, K. Emanuel, J.P. Abraham, Climate Science and Meteorology, *AMS National Broadcast Meteorology Conference*, Boston, MA, August 24, 2012
  66. J.P. Abraham, J. Jeske, and M. Nelson, Thermal and Fluid Flow Simulations in Health Care: Product Development and Safety Improvement, *Design of Medical Devices Conference*, Minneapolis, MN April 10-12, 2012.
  67. J.P. Abraham, Climate Myths, Misconceptions, and Their Creators, American Chemical Society, St. Paul, MN, November 13, 2012.
  68. I. Enting, J.P. Abraham, Detailed Debunking of Denial, *AGU Winter Meeting 2012*, December 3-7, San Francisco, 2012.
  69. B.D. Plourde, J.P. Abraham, G.S. Mowry, E.M. Sparrow, Experimental Test of Multi-Stage Vertical-Axis Turbines for Cellular Communication Applications, *ASME 6<sup>th</sup> International Conference on Energy Sustainability*, San Diego, CA, July 23-26, 2012.
  70. M.N. Nelson and J.P. Abraham, Hemodynamics of AV Grafts for Hemodialysis Access, *Design of Medical Devices Conference*, Minneapolis, MN April 10-12, 2012.

71. J.P. Abraham and J.S. Jeske, Cryosurgical Simulations for Ablation of Kidney Tumors, *Design of Medical Devices Conference*, Minneapolis, MN April 10-12, 2012.
72. J.P. Abraham, J.R. Stark, and J.M. Gorman, Drag Calculations on Oceanographic Devices, *ANSYS Regional Conference*, Minneapolis, MN, October 20, 2011.
73. J.P. Abraham, B.D. Plourde, and G.S. Mowry, Fluid Dynamic Simulations of Wind Turbines, *ANSYS Regional Conference*, Minneapolis, MN, October 20, 2011.
74. S.A. Mandia, J.P. Abraham, R. Weymann, and M. Ashley, The Climate Science Rapid Response Team – A Model for Science Communication, *Geological Society of America Annual Meeting and Exposition*, Minneapolis, MN, October 9-12, 2011.
75. S.A. Mandia, J.P. Abraham, R.J. Weymann, and M. Ashley, The Climate Sciences Rapid Response Team – A Model for Science Communication, *American Geophysical Union Fall Meeting*, San Francisco, CA December 5-9, 2011.
76. J.P. Abraham, J. Stark, J. Gorman, F. Reseghetti, J. Willis, and J. Lyman, Preliminary Fluid Drag Calculations for Expendable Bathythermograph Devices, *American Geophysical Union Fall Meeting*, San Francisco, CA December 5-9, 2011.
77. S.A. Mandia, J.P. Abraham, R.A. Weymann, and M. Ashley, Scientists Shaping the Discussion, *American Geophysical Union Fall Meeting*, San Francisco, CA December 5-9, 2011.
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79. B.M. Osende, J.P. Abraham, and G.S. Mowry, The Design, Installation, and Maintenance of a Village-Sized Solar Power System in Uganda, *Nanotech, Cleantech, Microtech 2011 Conference*, June 13-16, 2011, Boston, MA. Published in the Technical Proceedings of the 2011 NSTI Nanotechnology Conference and Expo, Vol. 3, pp. 755-758, 2011.
80. J.M. Gorman, E.M. Sparrow, G.S. Mowry, and J.P. Abraham, Simulation of Helically Wrapped, Compact Heat Exchangers, *ASME 2011 Energy Sustainability Conference*, Washington, DC, August 7-10, 2011.
81. B.D. Plourde, J.P. Abraham, G.S. Mowry, and W.J. Minkowycz, Vertical-Axis Wind Turbines for Powering Cellular Communication Towers, *Nanotech, Cleantech, Microtech 2011 Conference*, June 13-16, 2011, Boston, MA. Published in the Technical Proceedings of the 2011 NSTI Nanotechnology Conference and Expo, Vol. 3, pp. 750-753, 2011.

82. L. Tran, M.P. Hennessey, and J.P. Abraham, Simulation and Visualization of Dynamic Systems: Several Approaches and Comparisons, *ASME International Mechanical Engineering Congress and Expo*, Vancouver, Canada, November 12-18, 2011.
83. J.P. Abraham, Global Warming, What does the Science Tell Us?, *7<sup>th</sup> Annual Environmental Institute Conference (KEYNOTE)*, Minneapolis, MN, April 21, 2010.
84. J.P. Abraham, G.S. Mowry, B.D. Plourde, and W.J. Minkowycz, Numerical Simulations of Vertical-Axis Wind Turbine Blades, *ASME 2011 Energy Sustainability Conference and Fuel Cell Conference*, Washington, DC, August 7-10, 2011.
85. J.P. Abraham, G.S. Mowry, B.D. Plourde, and W.J. Minkowycz, Wind Tunnel Tests of Vertical-Axis Wind Turbine Blades, *ASME 2011 Energy Sustainability Conference and Fuel Cell Conference*, Washington, DC, August 7-10, 2011.
86. R.D. Lovik, E.M. Sparrow, J.P. Abraham, C.L. Zelmer, S.K.S. Friend, and D.K. Smith, Effect of Component Misalignment on Human Tissue Temperatures Associated with Recharging Neuromodulation Devices, *Design of Medical Devices Conference*, Minneapolis, MN April 12-14, 2011.
87. N.N. Johnson, K. L. McCaffrey, K.M. Rose, and J.P. Abraham, Cryosurgical Treatments for Uterine Fibroids, *ASME 2010 International Congress and Expo*, Vancouver, CA, November 12-18, 2010.
88. R.D. Lovik, K. J. Kelly, E.M. Sparrow, and J.P. Abraham, Effect of Misalignment of Implant and Antenna on Heat Generation of Externally Recharged Neuromodulation Implants, *North American Neuromodulation Society 14<sup>th</sup> Annual Meeting*, Las Vegas, NV, December 2-5, 2010.
89. J.P. Abraham and S. Mandia, An Emerging Ethic of Responsibility: A Case Study for Engaging the Public, *American Geophysical Union Fall Meeting*, San Francisco, CA December 13-17, 2010.
90. J.P. Abraham and G.S. Mowry, B.D. Plourde, Analysis of Thermal and Fluid Flow Problems, *Thermal Packaging and Small Business Innovation Workshop*, Eagan, MN, October 5-6, 2010.
91. N.N. Johnson, J.P. Abraham, Z.I. Helgeson, and M.P. Hennessey, Numerical Simulation of Blood Flow in the Presence of Embolizing Agents, *ASME 2010 International Congress and Expo*, Vancouver, CA, November 12-18, 2010.
92. N.N. Johnson, J.P. Abraham, and Z.I. Helgeson, Calculations of Scald Burns: Effects of Water Temperature, Exposure Duration, and Clothing, *ASME 2010 International Congress and Expo*, Vancouver, CA, November 12-18, 2010.

93. N.N. Johnson, M.P. Hennessey, and J.P. Abraham, Swept Arc Length Measure of Abrasive Wear, *ASME 2010 International Congress and Expo*, Vancouver, CA, November 12-18, 2010.
94. K.L. McCaffrey, K.M. Rose, and J.P. Abraham, Numerical Simulation of Cryosurgery as a Potential Treatment for Uterine Fibroids, *14<sup>th</sup> International Heat Transfer Conference*, Washington, D.C., August 8-13, 2010.
95. J.P. Abraham, E.M. Sparrow, J.C.K. Tong, and W.J. Minkowycz, Intermittent Flow Modeling. Part 1: Hydrodynamic and thermal Modeling of Steady, Intermittent Flows in Constant Area Ducts, *14<sup>th</sup> International Heat Transfer Conference*, Washington, D.C., August 8-13, 2010.
96. J.P. Abraham, E.M. Sparrow, J.C.K. Tong, and W.J. Minkowycz, Intermittent Flow Modeling. Part 2: Time-Varying Flows and Flows in Variable Area Ducts, *14<sup>th</sup> International Heat Transfer Conference*, Washington, D.C., August 8-13, 2010.
97. K.L. McCaffrey, K.M. Rose, and J.P. Abraham, Cryosurgery as an Alternative Treatment for Menorrhagia and Uterine Fibroids, *ASME Summer Biomedical Engineering Conference*, Naples, FL, June 16-19, 2010.
98. J.M. Gorman, N.K. Sherrill, J.P. Abraham, Analysis of Drag-Reducing Techniques for Olympic Skeleton Helmets, *ANSYS Users Conference*, Minneapolis, MN, June 11, 2010.
99. B. D. Plourde, J.P. Abraham, G.S. Mowry, Numerical Simulation of Vertical Axis Wind Turbines, *ANSYS Users Conference*, Minneapolis, MN, June 11, 2010.
100. J.P. Abraham, Z.I. Helgeson, N.N. Johnson, G.S. Mowry, Numerical Simulations and Medical Device Design, *ANSYS Users Conference*, Minneapolis, MN, June 11, 2010.
101. J.M. Gorman, N.K. Sherrill, J.P. Abraham, Drag-Reducing Vortex Generators and Olympic Skeleton Helmet Design, *ANSYS Users Conference*, Chicago, IL, June 7, 2010.
102. J.P. Abraham, Z.I. Helgeson, N.N. Johnson, G.S. Mowry, (Keynote), Numerical Simulations in Biomedical Design, *ANSYS Users Conference*, Chicago, IL, June 7, 2010.
103. J.P. Abraham, E.M. Sparrow, Y. Bayazit, R.D. Lovik, and D.S. Smith, Numerical and Experimental Simulations as Symbiotic Tools for Solving Complex Bio-Thermal Problems, *Design of Medical Devices Conference*, Minneapolis, MN April 13-15, 2010.

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104. E.M. Sparrow and J.P. Abraham, Numerical Solutions of Biological Heat Transfer, *Design of Medical Devices Conference*, Minneapolis, MN April 13-15, 2010.
  105. J.P. Abraham, R.D. Lovik, D.S. Smith, E.M. Sparrow, and K.J. Kelly, Heat Generation Measurements of Revised Neuromodulation Devices and Calculations of Tissue Temperatures, *North American Neuromodulation Society 13th Annual Meeting*, Las Vegas, December 3-6, 2009.
  106. J.P. Abraham and E.M. Sparrow, Numerical Simulation as a Tool for Assessing Thermal- and Fluid-Based Processes and Therapies, *Institute for Engineering in Medicine Innovation Showcase*, Minneapolis, MN, September 22, 2009.
  107. J.P. Abraham, E.M. Sparrow, and R.D. Lovik, An Investigation of Tissue-Temperature Elevation Caused by Recharging of Transcutaneous Nueromodulation Devices, *31<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine in Biology Society*, Minneapolis, MN, September 2-7, 2009.
  108. R.D. Lovik, J.P. Abraham, and E.P. Sparrow, Pulsating Fluid Flows Undergoing Transitions Between Laminar, Transitional, and Turbulent Regimes, *ASME 2009 Summer Bioengineering Conference*, Lake Tahoe, CA, June 17-21, 2009.
  109. E.M. Sparrow, and J.P. Abraham, Case Studies on the Use of Numerical Simulation for design and Optimization of Medical Devices, *Design of Medical Devices Conference*, Minneapolis, MN April 14-16, 2009.
  110. F. Hoover and J. Abraham Assessment of the Carbon Dioxide and Energy Balances of Biofuels, *Climate Change Technology Conference 2009*, Hamilton, Ontario, May 12-15, 2009.
  111. J.P. Abraham, G.S. Mowry, and R.E. Erickson, Design and Analysis of a Small-Scale Vertical-Axis Wind Turbine for Rooftop Power Generation, *Climate Change Technology Conference 2009*, Hamilton, Ontario, May 12-15, 2009.
  112. F. Hoover and J.P. Abraham, A review: Comprehensive Comparison of Corn-based and Cellulosic-based Ethanol as Biofuel Sources, *Clean Technology Conference and Expo 2009*, Houston, TX, May 3-7, 2009.
  113. J.P. Abraham, G.S. Mowry, and R.E. Erickson, Design and Analysis of a Small-Scale Vertical-Axis Wind Turbine, *Clean Technology Conference and Expo 2009*, Houston, TX, May 3-7, 2009.
  114. J.P. Abraham, R.D. Lovik, and E.M. Sparrow, Tissue Temperature Rises Due to Heat Generation in Neuromodulation Implants, *North American Neuromodulation Society 12th Annual Meeting*, Las Vegas, December 4-7, 2008.



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115. G. Nelson, A. Majewicz, and J.P. Abraham, Numerical Simulation of Thermal Injury to the Artery Wall During Orbital Atherectomy, *ANSYS International*, Pittsburgh, PA, August 26-29, 2008.
  116. J.P. Abraham, Integrating Integration of ANSYS/CFX into Classrooms, *ANSYS International*, Pittsburgh, PA, August 26-29, 2008.
  117. J.P. Abraham, Pressure Drop and Heat Transfer Calculations for Laminar-Turbulent Intermittent Flows, *ANSYS International*, Pittsburgh, PA, August 26-29, 2008.
  118. J.P. Abraham, J.C.K. Tong, and E.M. Sparrow, Prediction of Laminar-Turbulent Transition and Friction Factors in Transitional Flows, *ASME International Congress and Expo*, Boston, MA, October 31 – November 5, 2008.
  119. R.D. Lovik, J.P. Abraham, and E.M. Sparrow, Assessment of Possible Thermal Damage of Tissue Due to Atherectomy by Means of a Mechanical Debulking Device, *ASME 2008 Summer Bioengineering Conference*, Marco-Island, FL, June 25-29, 2008.
  120. J.P. Abraham and A.P. Thomas, Numerical Simulation of Induced Co-Flow and Laminar-to-Turbulent Transition Associated with Synthetic Jets, *Flucome 2007*, Tallahassee, FL, September 16-19, 2007.
  121. J.P. Abraham and C.M. George, An Investigation of Radiation Shields for Full-Building Cooling in Desert Climates, *Solar 2007*, Cleveland, OH July 7-12, 2007.
  122. A. Marchese, J.P. Abraham, C.S. Greene, L. Kizenwether, and J. Ochs, Toward a Common Standard Rubric for Evaluating Capstone Design Projects, *National Capstone Design Course Conference*, Boulder, CO June, 13-15, 2007 (Best Paper Award).
  123. John Abraham, Chris Greene, Anthony Marchese, External Assessment Through Peer-to-Peer Evaluation of Capstone Projects, *Frontiers in Education*, Milwaukee, WI, October, 10-13, 2007.
  124. John Abraham, Computation Fluid Dynamics Using ANSYS CFX, presented at the University of Minnesota Digital Technology Center, Sept. 12 and 14, 2006.
  125. John Abraham, Application of the Finite Element Method, *LifeSciences Conference*, Minneapolis, October 5, 2006.
  126. John Kim and John Abraham, Design of Experiments in the Medical Device Industry, *LifeSciences Conference*, Minneapolis, October 5, 2006.
  127. Ephraim Sparrow, Nick Whitehead, and John Abraham, Fluid Flow Dynamics in the Urinary Tract – Impact on Device Design, Presented to the Department of Urologic Surgery, April 17, 2006.

128. John Abraham, Nick Whitehead, and Ephraim Sparrow, Numerical Simulation of Thermal Therapies, Presented to the Department of Urologic Surgery, April 17, 2006.
129. John Abraham, Nick Whitehead, and Ephraim Sparrow, Biomedical Applications Simulations/Experimental Investigations, *Biomedical Focus 2006*, Brooklyn Center, MN, March 20-21, 2006.
130. Nick Whitehead, Ephraim Sparrow, and John Abraham, A Role for Engineering in Medical Simulations, *Simulation in Healthcare*, Minneapolis, MN, November 28, 2005.
131. Ronald Major and John Abraham, The Application of Thermal Analysis on a Disk Array, *Fluent's 2005 CFD Summit*, Detroit, MI, June 7-8, 2005.
132. Camille George and John Abraham, A Sustainable Low-Energy Cooling System for Hot Dry Climates, *Sustainability as Security*, Austin, TX, October 5-9, 2005.
133. John P. Abraham and Ephraim M. Sparrow, Irrelevance of the Relative Velocity as the Characteristic Velocity When Both a Fluid and its Bounding Surface are in Motion, *Lorenz G. Straub Award*, Minneapolis, MN, November 13, 2004.
134. John P. Abraham and Ephraim M. Sparrow, An Unexpected U-Turn After an Eckert Straight Start, *Eckert Symposium*, Minneapolis, MN, September 13-14, 2004.
135. John P. Abraham and Ephraim M. Sparrow, Methodologies to Enhance the Numerical Simulations of Electronic Cooling, *Semi-Therm Conference*, San Jose, CA, March 9-10, 2004.
136. Ephraim M. Sparrow, John P. Abraham, and Paul Chevalier, A DOS-Enhanced Numerical Simulation of Heat Transfer and Fluid Flow Through an Array of Offset Fins with Conjugate Heating in the Bounding Solid, *ASME International Mechanical Engineering Congress and R & D Expo*, Washington, DC, November, 2003.
137. J. P. Abraham, Ephraim M. Sparrow, Student-Related Research "Thermal Design Capstone Projects", *ASME International Mechanical Engineering Congress and R & D Expo*, Washington, DC, November, 2003.
138. Sparrow, E.M., Martin, G.L., Abraham, J.P., and Tong, J.C., Air-to-Air Energy Exchanger Test Facility for Mass and Energy Transfer Performance. *American Society of Heating, Refrigeration, and Air-Conditioning Engineers Annual Meeting*, Inc., Cincinnati, OH, ASHRAE Symposium Paper, 2001.
139. Tamma, K.K., Zhou, X., Abraham, J., and Anderson, C.V.D.R., Constitutive Model Theories and Plausible Propositions/Challenges to Heat Transport Characterization. *ASME/JSME Joint Thermal Engineering Conference*, March, 1999.

**Granted Patents**

1. Robert Monson and John Abraham, “Dual-phase thermal electricity generator”, U.S. Patent # 8,484,974.
2. Robert Monson and John Abraham, “Variable Orifice Valve”, U.S. Patent # 7,559,485
3. Robert Monson, John Abraham, Joseph Crimando, Joel Farley, Matthew Linder, and Joel Seipel, "Vehicle Energy Absorption Apparatus", US Patent # 8,118,255.
4. B.D. Plourde and J.P. Abraham, “Rotor Blade for Vertical Axis Wind Turbine”, US Patent # 9,482,204/ WO 2011150171.
5. B.D. Plourde, J.P. Abraham, D.R. Plourde, A. Gikling, R. Pakonen, “Dual-Axis Tracking Device”, US Patent # 10,168,412.
6. B. D. Plourde, J. P. Abraham, D.R. Plourde, R. Pakonen, “Control Valve Assembly for Fluid Heating System”, US Patent # 10,495,720.
7. B. D. Plourde, J. P. Abraham, D.R. Plourde, R. Pakonen, “Dual Axis Tracking Device”, China National Intellectual Property Administration, Patent number ZL201580075224.1, 2020.
8. B.R. Plourde, J. P. Abraham, D.R. Plourde, R. Pakonen, “Dual Axis Tracking Method”, U.S. Patent (granted May 2020, number forthcoming).

**Pending Patents**

1. B. D. Plourde, J. P. Abraham, D.R. Plourde, R. Pakonen, “Method of Calculating Pathogen Inactivation for Fluid Heating System”, US Patent Application Number 14/954,383, Filed December 1, 2015.
2. B.D. Plourde, J.P. Abraham, D. Plourde, R. Pakonen, A. Gikling, N. Naughton, “Fluid Heating System”, US Patent Application Number 14/954,292, filed December 1, 2015.
3. B.D. Plourde, J.P. Abraham, “Solar Heating System”, US Patent Application No. 62/423,814 (filed November 18, 2016).
4. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, “Digital Fluid Heating System”, US Patent Application Number 15/818,052, filed November 20, 2017; PCT Application Number US2017/062558, filed November 20, 2017.
5. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, “Solar Heating for Refrigeration and Fluid Heating Devices”, filed March 2018.

**Granted Trademarks**

1. US Trademark Registration Number 5656322, assignee: WTS LLC, Minnesota, USA.  
Trademark granted, January 15, 2019.
2. US Trademark Registration Number 5656323, assignee: WTS LLC, Minnesota, USA.  
Trademark granted, January 15, 2019.

**CONSULTANTSHIPS****GRANTS (funding \$2.643 million)**

<i>Cardiovascular Systems, Inc.</i>	2019
<i>ALS Consulting</i>	2019
<i>Medivators</i>	2018-2019
<i>Medivators, MN</i>	2014-2015
<i>EKOS, MN</i>	2018
<i>Marcor</i>	2018
<i>Marvin Windows</i>	2018
<i>Medtronic, Fridley, MN</i>	2017-2020
<i>Orbital ATK</i>	2017-2018
<i>Pride Engineering, MN</i>	2017-2018
<i>Cargill, MN</i>	2016-2017
<i>EKOS, MN</i>	2016-2017
<i>Precision Air, MN</i>	2016
<i>3M, MN</i>	2015-2017
<i>Flourescence, Inc., MN</i>	2015
<i>Smiths Medical, MN</i>	2014-2015
<i>WTS LLC, MN</i>	2014-2020
<i>Medivators, MN</i>	2014-2015
<i>Somnetics, MN</i>	2014
<i>Lake Region Medical, MN</i>	2013-2014
<i>Amphora Medical, MN</i>	2013-2014
<i>ALS Consulting, MN</i>	2013-2016
<i>Medtronic, Fridley, MN</i>	2013-2016
<i>Devicix, MN</i>	2012-2013
<i>CriticCare, MN</i>	2012
<i>HRST, Inc., MN</i>	2012-2015
<i>QIG Group, OH</i>	2011-2013
<i>Phraxis, MN</i>	2011-2012
<i>Cardiovascular Systems, Inc., Roseville, MN</i>	2007-2015
<i>Translational Biologic Infusion, AZ</i>	2011-2013
<i>Galil Medical, Roseville, MN</i>	2011
<i>Imation, Oakdale, MN</i>	2010
<i>Medtronic, Fridley, MN</i>	2008-2011
<i>R4 Engineering, India</i>	2008-2009
<i>Horizontal Winds,</i>	2008-2009
<i>Lockheed Martin, Eagan, MN</i>	2007-2009
<i>St. Jude Medical, Minnetonka, MN</i>	2007-2009
<i>Arizant Medical, Eden Prairie, MN</i>	2006

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**John P. Abraham**

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<i>Johnson and Johnson, Newark, NJ</i>	<b>2004-2005</b>
<i>Cortron/XeteX, Fridley, MN</i>	<b>2005</b>
<i>Donaldson Co., Bloomington, MN</i>	<b>1999-2003</b>
<i>Augustine Medical, Eden Prairie, MN</i>	<b>2000-2003</b>
<i>Midmac Systems Inc., St Paul, MN</i>	<b>2002</b>
<i>Remmele Engineering Inc., St Paul, MN</i>	<b>2002-2005</b>
<i>Urologix, Minneapolis, MN</i>	<b>circa 2004</b>
<i>Restore Medical, Minneapolis, MN</i>	<b>circa 2002</b>
<i>Caterpillar, Minneapolis, MN</i>	<b>circa 2000</b>
<i>ADC telecom, Minneapolis, MN</i>	<b>circa 2000</b>
<i>XeteX, Inc., Minneapolis, MN</i>	<b>1996-2000</b>
<i>Pneuseal, St. Paul, MN</i>	<b>1996-1998</b>
<i>Los Alamos National Laboratory, Los Alamos, NM</i>	<b>1994</b>

**GRANTS (funding \$2.393 million)**

<b>Cardiovascular Systems, Inc.</b>	<b>2019</b>
\$13k for thermal model of blower impellor	
\$9k for thermal model of blower impellor	
\$4k for thermal model of blower impellor	
<b>ALS Consulting</b>	<b>2019</b>
\$15k for thermal model of power plant	
<b>Medivators</b>	<b>2019</b>
\$12k for thermal model of thermal sterilization	
<b>Marvin Windows</b>	<b>2019</b>
\$5k for thermal model of manufacturing line	
\$4k for thermal model of manufacturing line	
<b>Medtronic</b>	<b>2019</b>
\$22k for simulation of tissue temperatures during transcutaneous recharge	
\$25.5k for simulation of tissue temperatures during transcutaneous recharge	
<b>Medivators</b>	<b>2018</b>
\$18k to research airflow in medical sterilization equipment.	
<b>Marvin Windows</b>	<b>2018</b>
\$6k to research thermal processes during window ventillation	
<b>Medtronic</b>	<b>2018</b>
\$3k to research battery heating rates	
\$8k to research thermal tolerance of brain tissue	
<b>EKOS</b>	<b>2018</b>

	\$14k for analysis of flow distribution within stents	
<b>Marcor</b>		<b>2018</b>
	\$10k for fluid and heat transfer analysis	
<b>Pride Engineering</b>		<b>2017</b>
	\$3k to calculate a metal stamping machine process	
<b>Orbital ATK</b>		<b>2017-2018</b>
	\$30k to simulate fluid flow	
	\$12k to simulate fluid flow	
<b>Medtronic</b>		<b>2017</b>
	\$5k to research thermal tolerance of brain tissue	
	\$14k to calculate cranial temperature increases during transcranial recharge	
<b>3M</b>		<b>2017</b>
	\$14k to simulate airflow in ultra-clean operating rooms.	
<b>Zoll Engineering</b>		<b>2017</b>
	\$5.5k for design of flow through a ventilation medical device	
<b>Cargill</b>		<b>2016-2017</b>
	\$14k for analysis of food frier	
	\$15k for analysis of a food processing device	
<b>EKOS</b>		<b>2017</b>
	\$14k for analysis of flow distribution within stents	
	\$14k for analysis of flow distribution within stents	
	\$12k for analysis of flow distribution within stents	
<b>ALS Consulting</b>		<b>2016</b>
	\$15k for analysis of fluid flow in power plants	
<b>Precision Air</b>		<b>2016</b>
	\$1600 for simulation of airflow in operating rooms	
<b>Medtronic</b>		<b>2016</b>
	\$12k for simulation of tissue temperatures during transcatheter recharge	
<b>3M</b>		<b>2015</b>
	\$12k to simulate airflow in ultra-clean operating rooms.	
<b>Cardiovascular Systems, Inc.</b>		<b>2015-2016</b>
	\$8,000 for the study of deformable arteries	
<b>AF Energy</b>		<b>2015</b>

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\$3000 wind turbine calculations	
<b>Intellectual Ventures Laboratory</b>	<b>2015</b>
\$2000 wall condensation calculations	
<b>Medivators</b>	<b>2015</b>
\$4000 for flow and pressure calculations medical chamber.	
<b>Floursecence, Inc.</b>	<b>2015</b>
\$2,000 designing biological heater for cell environments	
<b>Mador Technologies</b>	<b>2015</b>
\$20,000 analyzing a liquid nitrogen water condensation device	
<b>Koronis Biomedical Technologies</b>	<b>2015</b>
\$5,000 simulation of fluid flow	
<b>Mador Technologies</b>	<b>2014-2015</b>
\$8,000 analyzing a liquid nitrogen water condensation device	
<b>National Resources Defense Council</b>	<b>2015</b>
\$10k for climate education work	
<b>Medtronic</b>	<b>2014</b>
\$12k for simulation of tissue temperatures during transcutaneous recharge	
<b>Smiths Medical</b>	<b>2014</b>
\$9.5k for design and optimization of medical warming blankets	
\$10k for the design and improvement of medical fans	
\$12k for the design and analysis of human thermal analogs	
<b>WTS LLC</b>	<b>2014-present</b>
\$1.25m for the design of solar pasteurization systems	
<b>Medivators</b>	<b>2014</b>
\$4000 for flow and pressure calculations medical chamber.	
\$3000 for flow and pressure calculations medical chamber.	
<b>Somnetics</b>	<b>2014</b>
\$6000 for flow and pressure calculations in CPAP devices.	
<b>Lake Region Medical</b>	<b>2013-2014</b>
\$4500 for simulations of a guidewire manufacturing oven	
<b>Amphora Medical</b>	<b>2013-2014</b>
\$55.5k for design of RF probes for ablation of bladder tissue	

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## John P. Abraham

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<b>ALS Consulting</b>	<b>2013-2014</b>
\$17.5k for analysis of fluid flow in power plants	
<b>Medtronic, Inc.</b>	<b>2012-2013</b>
\$13k for analysis of subdermal heating associated with recharge of neuromodulation systems.	
<b>Phraxis</b>	<b>2013</b>
\$2,250 for the analysis of blood flow through an AV shunt	
<b>Translational Biologic Infusion Catheter</b>	<b>2011-2013</b>
\$21.5k for the study of flow and pressure drop in a stem-cell delivery catheter	
<b>Advanced Circulatory Systems, Inc.</b>	<b>2013</b>
\$4200 for fluid flow modeling of medical-device blowers	
<b>HRST, Inc.</b>	<b>2012-2015</b>
\$11,250 for analysis of flow patterns in manifolds	
<b>Devicix</b>	<b>2012</b>
\$2000 for the analysis of medical-fluid injection devices	
<b>Helical</b>	<b>2012-2013</b>
\$18,200 for the design and analysis of rooftop wind turbines	
<b>QiG Group</b>	<b>2012</b>
\$7000 for study of thermoelectric technologies to power implants	
<b>HRST, Inc.</b>	<b>2012</b>
\$4300 for analysis of perforated plates for flow uniformity	
<b>Energy Foundation</b>	<b>2012-2013</b>
\$30k developing climate-science communication strategies	
<b>CriticCare</b>	<b>2012</b>
\$4,275 for numerical modeling of accelerated aging of medical devices.	
<b>HRST, Inc.</b>	<b>2012</b>
\$5,540 for research study on mixing efficiency in heat recovery plants.	
<b>Windstrip, LLC</b>	<b>2009-2013</b>
\$250k for development of vertical axis wind turbines to power cellular communication equipment.	
<b>QiG Group</b>	<b>2011-2012</b>
\$20k for study of implant heating of biological tissue	



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<b>Phraxis</b>	<b>2011-2012</b>
\$8,000 for the analysis of blood flow through an AV shunt	
<b>Energy Foundation</b>	<b>2011-2012</b>
\$71k developing climate-science communication strategies	
<b>Cardiovascular Systems, Inc.</b>	<b>2011</b>
\$23k for the study of paclitaxel distribution techniques.	
<b>Cardiovascular Systems, Inc.</b>	<b>2011</b>
\$5,000 for the study of temperature management in palleted products	
<b>Galil Medical</b>	<b>2011</b>
\$9,000 for the kidney tumor cryosurgical devices.	
<b>Multiple groups</b>	<b>2010</b>
\$13,000 for installation of solar panels in Uganda	
<b>Imation</b>	<b>2010</b>
\$10k for the design of a polymeric extrusion die	
<b>Cypress Wind</b>	<b>2010</b>
\$30.6k for the development of a vertical axis, small-footprint wind turbine.	
<b>Cypress Wind</b>	<b>2009</b>
\$27k for the development of a vertical axis, small-footprint wind turbine.	
<b>Cardiovascular Systems, Inc.</b>	<b>2009</b>
\$80k for the study of cavitation and bolus formation during orbital atherectomy procedures.	
<b>Medtronic, Inc.</b>	<b>2008-2011</b>
\$65k for analysis of subdermal heating associated with recharge of neuromodulation systems.	
<b>University of St. Thomas Faculty Development Grant</b>	<b>2009</b>
\$4,200 for the purchase of a high-performance computer for numerical simulations.	
<b>CSUMS: A computational Training and Interdisciplinary Research Program for Undergraduates in the Mathematical Sciences at the University of St. Thomas</b>	<b>2008-2013</b>
Served as Senior Personnel on a \$716,836 NSF award for the development of applied research projects for undergraduates in mathematics.	
<b>Lockheed Martin Innovative Program - Advanced Cooling Technology grant</b>	<b>2009</b>
\$19.5k for the improvements to avionics heat pipe applications.	
<b>Horizontal Winds</b>	<b>2008-2009</b>

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\$11k for research on vertical-axis wind turbines	
<b>R4 Engineering</b>	<b>2008-2009</b>
\$10k for analysis of building-support insulation systems	
<b>Lockheed Martin Innovative Program - Advanced Cooling Technology grant</b>	<b>2007</b>
\$53k for the development of advanced electronic-cooling methodologies.	
<b>Arizant Medical</b>	<b>2006</b>
Characterization of a forced-air patient warming device	
<b>Johnson and Johnson, Newark, NJ</b>	<b>2004-2005</b>
Analysis of a uterine fibroid embolization device	
<b>Urologix</b>	<b>circa 2004</b>
Design of thermoelectric device for heating/cooling of urological catheter fluids	
<b>Donaldson Co.</b>	<b>1999-2003</b>
Analysis and characterization of a filter-manufacturing device	
<b>Augustine Medical</b>	<b>2000-2003</b>
Characterization of a forced-air patient warming device	
<b>Midmac Systems Inc.</b>	<b>2002</b>
Thermal analysis of a polymeric sealing machine	
<b>Restore Medical</b>	<b>circa 2002</b>
Characterization of sleep apnea treatment	
<b>Remmele Engineering Inc.</b>	<b>2002-2005</b>
Thermal analysis of a polymeric sealing machine for insulin packaging	
<b>Caterpillar</b>	<b>circa 2000</b>
Analysis of a screed heating machine	
<b>ADC Telecom</b>	<b>circa 2000</b>
Optimization of an AC/DC power converter	
<b>XeteX, Inc</b>	<b>1996-2000</b>
Design of an air-to-air heat exchanger	
Creation of a film processing machine for coating heat exchangers	
Construction and operation of a full-sized HVAC test facility	
<b>Pneuseal</b>	<b>1996-1998</b>
Operation and optimization of a polymeric sealing device for medical packaging	

**Principal Investigator – Supercomputing Institute** **2002-2012**

Served as PI for multi-year project dedicated to performing computational fluid dynamic studies. This grant awarded computing resources at the Supercomputing Institute for Digital Simulation and Advanced Computing.

**Principal Investigator – ASHRAE Project Grant Program** **2003**

Awarded a \$5,000 grant funded by ASHRAE to investigate the efficacy of rotating-wheel heat and moisture exchangers.

**Faculty Advisor – Bush Grant, Young Scholars Program** **2002**

Faculty advisor for a \$3,000 grant for undergraduate research of air-jet heat transfer for surgical applications.

**Faculty Advisor – Bush Grant, Young Scholars Program** **2002**

Faculty advisor for a \$3,000 grant for undergraduate research to encourage American Indian students to pursue careers in science and technology.

**A Multi-Function Heat Exchanger for Control of Temperature, Moisture,  
and Air Quality** **1997-2000**

Project Engineer for \$475K SBIR grants awarded by NSF, grant nos. 9660900 and 9801062