

**CV – DR. JOHN ABRAHAM**

**SUMMARY**

Thermal science expert with experience in all aspects of heat transfer and fluid mechanics. Produced approximately 450 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 approximately 200 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**

- Editor's Choice Award, Journal of Forensic Sciences, (2022).
- AAS Esteemed News and Views Paper Prize, (2022)
- Journal of Atmospheric and Oceanic Technology, Editor award (2020)
- 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

2013-2022

### PUBLICATIONS

(21 edited works, 3 books, 37 book chapters, 272 journal publications, 147 presentations, 16 granted patents, 5 patent applications, 2 granted trademarks)

### TOP PUBLICATIONS BY ALTMETRIC

L. Cheng, J.P. Abraham, K.E. Trenberth, J.T. Fasullo, T. Boyer, M.E. Mann, J. Zhu, F. Wang, R. Locarnini, Y. Li, B. Zhang, F. Yu, L. Wan, X. Chen, X. Song, Y. Liu, F. Reseghetti, S. Simoncelli, V. Gouretski, G. Chen, A. Mishonoc, J. Reagan, and G. Li, Another Year of Record Heat for the Oceans, *Advances in Atmospheric Sciences*, (in press). **Altmetric score = 1438, top 1% in all journals, January 2023. This altmetric score places the paper in the top 1% (top 100 out of 214000 papers) in all journals, and within the top 1% of papers in the publishing journal.**

L. Cheng, J.P. Abraham, K.E. Trenberth, J. Fasullo, T. Boyer, M.E. Mann, J. Zhu, F. Wang, R. Locarnini, Y. Li, B. Zhang, Z. Tan, F. Yu, L. Wan, X. Chen, X. Song, Y. Liu, F. Reseghetti, S. Simoncelli, V. Gouretski, G. Chen, A. Mishonov, J. Reagan, Another Record Ocean Warming Continues Through 2021 Despite La Nina Conditions, *Advances in Atmospheric Sciences*, Vol. 39, 373-385, 2022). **Altmetric score = 4686, top 1% in all journals, January 2022. This altmetric score places the paper in the top 0.02% (top 57 out of 287000 papers) in all journals, and within the top 1% of papers in the publishing journal.**

L. Cheng, J.P. Abraham, K.E. Trenberth, J.T. Fasullo, T.L. Boyer, R. Locarnini, B. Zhang, F. Yu, L. Wan, X. Chen, X. Song, Y. Liu, M.E. Mann, F. Reseghetti, S. Simoncelli, V. Gouretski, G. Chen, and J. Zhu, Upper Ocean Temperatures Hit Record High in 2020, *Advances in Atmospheric Sciences*, Vol. 38, pp. 523-530, 2021. **Altmetric score = 1439, top 1% in all journals, August 2021.**

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*, Vol. 10, pp. 1116-1123, 2020. **Altmetric score = 726, top 1%, July 2021.**

J.P. Abraham, B. D. Plourde, and L. Cheng, Using Heat to Kill SARS-CoV-2, *Reviews in Medical Virology*, Vol. 30, e2115, 2020. **Altmetric score = 392, top 1%, July, 2021.**

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. **This paper was in the top 100 of all published**

**scientific papers in the year 2020, ranked by Altmetric. Also, second of all 2020 papers in the subject area of climate. Altmetric score = 3957, top 1%, January 2021.**

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. **Altmetric score = 646, top 1%, January 2021.**

L. Cheng, J.P. Abraham, Z. Hausfather, and K.E. Trenberth, How fast are the oceans warming?, *Science*, Vol. 363, pp. 128-129, 2019. **Altmetric score = 2853, top 1%, January 2021.**

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. **Altmetric Score = 753, top 1%, January 2021.**

### **Editing Activities (21 editorial activities)**

1. Editor, Special edition in Numerical Heat Transfer B – AI methods in heat transfer (2023)
2. Editor, *Advances in Heat Transfer*, Vol. 56, (forthcoming, 2023).
3. Editor, *Advances in Heat Transfer*, Vol. 55, (forthcoming, 2023).
4. Editor in Chief, Numerical Heat Transfer A/B
5. Editor, *Advances in Atmospheric Sciences (AAS)*, 2022.
6. Editor, *Advances in Heat Transfer*, Vol. 54, Elsevier, 2022.
7. Editor, *Advances in Heat Transfer*, Vol. 53, Elsevier, 2021.
8. Editor, *Advances in Heat Transfer*, Vol. 52, Elsevier, 2020.
9. Editor, *Advances in Heat Transfer*, Vol. 51, Elsevier, 2019.
10. Editor, *Advances in Heat Transfer*, Vol. 50, Elsevier, 2018.
11. Editor, *Advances in Heat Transfer*, Vol. 49, Elsevier, 2017.
12. Editor, *Advances in Heat Transfer*, Vol. 48, Elsevier, 2016.
13. Editor, *Advances in Heat Transfer*, Vol. 47, Elsevier, 2015.
14. Editor, *Advances in Heat Transfer*, Vol. 46, Elsevier, 2014.
15. Editor, *Advances in Numerical Heat Transfer Vol. 5: Numerical Models of Heat Exchangers*, Taylor and Francis, New York, 2017.
16. Editor, *Small-Scale Wind Power – Design, Analysis, and Economic Impacts*, Momentum Press, 2014.
17. Editor, *Advances in Heat Transfer*, Vol. 45, Elsevier, 2013.
18. Editor, *Advances in Heat Transfer*, Vol. 44, Elsevier, 2012.
19. Editor, *Advances in Numerical Heat Transfer Vol. 4: Nanoscale Heat Transfer and Fluid Flow*, Taylor and Francis, New York, 2012.
20. Guest Editor, *Advances in Numerical Heat Transfer Vol. 3: Numerical Implementation of Biological Models and Equations*, Taylor and Francis, New York, 2009.
21. Guest Editor, Special Edition of the *International Journal of Heat and Mass Transfer: Bioheat and Biofluid Flow*, Elsevier, Vol. 51, 23-24, November, 2008.
22. 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. Water Eng. & sciences.2023-present
2. *Advances in Atmospheric Sciences*, 2022-present
3. *International Journal of Forensic Sciences*, 2023-present
4. *International Society of Cardiovascular Translational Research*, 2020-present
5. *Energies, Thermal Management*, 2019-present

6. Cardiovascular Revascularization Medicine, 2018-present
7. Stem Cell Biology and Transplantation, 2015-present
8. Associate Editor, National Center for Science Education, Climate Science, 2012-present
9. International Journal of Mechanics and Energy, 2012-present
10. Open Mechanical Engineering Journal, 2007-present
11. Open Mechanical Engineering Reviews, 2007-present
12. Open Mechanical Engineering Letters, 2007-present
13. Open Medical Devices Journal, 2008-present
14. Creative Engineering Journal, 2009-present
15. ISRN Applied Mathematics, 2011-present
16. International Journal of Sustainable Energy, 2012 - present
17. 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 (author of 37 book chapters)**

1. D.K. Vashwakarma, S. Bhattacharyya, M.L. Soni, and J.P. Abraham, Effect of Inlet Flat Obstruction on Thermohydraulic Characteristics in a Smooth Circular Tube in the Transitional Flow Regime, in Bhattacharyya, Verma, Harikrishnan (eds), *Fluid Mechanics and Fluid Power, Vol. 3, Lecture Notes in Mechanical Engineering*, Springer, doi: 10.1007/978-981-19-6270-7\_76.
2. F. Salamsi and J.P. Abraham, On the Finite Differences Method Using MS Excel, *Research Highlights in Mathematics and Computer Science* Vol. 6, pp 140-186, 2023.
3. F. Salamsi and J.P. Abraham, Boundary of Transition Flow Regime on Stepped Spillways by Physical Modeling, *Current Overview on Science and Technology Research*, (in press).
4. F. Salamsi and J.P. Abraham, Determination of Stilling Basin Invert Elevation and its Effect on Controlling Hydraulic Jumps, Chapter 5, *Techniques and Innovation in Engineering Research*, Vol. 2, 2022.
5. F. Salamsi and J.P. Abraham. Energy Loss at the Base of a Free Straight Drop Spillway, *Current Overview on Science and Technology Research*, Vol. 6, 2, 2022.
6. F. Salamsi and J.P. Abraham, Computation of Optimal Cross Section of Gravity Dams Using Genetic Algorithms, *Current Overview on Science and Technology Research*, Vol. 6, Chapter 1, 2022.
7. F. Salamsi and J.P. Abraham, Flow Characteristics of Skimming Regime Flow Over Stepped Spillways with Attention to Optimum Step Size, *Current Overview on Science and Technology Research*, Vol. 6, Chapter 3, 2022.

8. F. Salamsi and J.P. Abraham, Determination of Stilling Basin Invert Elevation and its Effect on Controlling Hydraulic Jumps, *Technological Innovation In Engineering Research*, (in press).
9. R. Daneshfaraz, E. Aminvash, and J.P. Abraham, Hydraulic Characteristics of Fish-Passes on Inclined Drops, *Research Developments in Science and Technology*, Vol. 4, pp. 108-123, 2022.
10. F. Salamsi, J.P. Abraham, and A. Salamsi, Design Considerations for Pumping Stations Using Variable Speed Pumps, *Novel Perspectives of Engineering Research*, Vol. 10, pp. 98-118, 2022.
11. F. Salamsi, J.P. Abraham, Drainage Gallery in Concrete Gravity Dams and its Effect on Reduction of Uplift Forces, *Novel Perspectives of Engineering Research*, Vol. 10 pp. 43-62, 2022.
12. F. Salamsi, and J.P. Abraham, Numerical Simulation Using the Finite Element Method to Investigate the Effect of Horizontal Drains and Cutoff Walls on Seepage and Uplift Pressure in Heterogeneous Earth Dams, *Novel Perspectives of Engineering Research*, Vol. 9, pp. 58-85, 2022.
13. F. Salamsi, J.P. Abraham, B. Nourani, Determining the Analysis of the Stability of Embankments Against Sliding and Prediction of Sliding and Critical Factor of Safety, *Novel Perspectives of Engineering Research*, pp. 98-125, 2022.
14. F. Salamsi and J.P. Abraham, Effect of Horizontal Drain Length and Cutoff Wall on Seepage and Uplift Pressure in Heterogeneous Earth Dam with Numerical Simulation, *Novel Perspectives of Engineering Research*, Vol. 9, pp. 58-85, 2022.
15. F. Salamsi and J.P. Abraham, Numerical Investigation of Reduction of Uplift Forces by Drain Pipes Under the Bed of a Canal, *Novel Perspectives in Engineering Research*, Vol. 7, pp. 117-139, 2022.
16. F. Salamsi and J.P. Abraham, A Case Study on the Weep Hole and Cutoff Wall Effect for Decreasing Uplift Pressure on Hydraulic Structures, *Innovations in Science and Technology*, Vol. 6, pp. 12-38, 2022.
17. F. Salamsi and J.P. Abraham, Comparison of Uplift Pressure and Hydraulic Gradient in Three Types of Dams: Concrete Gravity dams, Homogeneous, and Heterogeneous Earth-Filled Dams, *Innovations in Science and Technology*, Vol. 3, pp. 71-86, 2022.
18. F. Salamsi and J.P. Abraham, Geological Considerations in Dam Engineering, *Novel Perspectives of Engineering Research*, Vol. 6, pp. 97-125, 2022.
19. B.D. Plourde, J. Kilonzo, J. Kiplagat, J.P. Abraham, and L. Cheng, From Sunlight to Drinking Water – The Design and Validation of a Solar-Pasteurization System, Published in *Handbook of Research on Heat Transfer*, edited by S. Bhattacharyya and V. Goel, Chapter 16, 2022.

20. A. Salamsi, J.P. Abraham, and F. Salamsi, Prospects for Application of Nanotechnology in Marine Industries, *Innovations in Science and Technology*, Vol. 4, pp. 84-106, 2022.
21. F. Salamsi and J.P. Abraham, Validity of Schaffernak and Casangrande analytical solutions for Seepage Through a Homogeneous Earth Dam and Comparison with Numerical Solutions Based on the Finited Element Method, in *Novel Perspectives of Engineering Research*, Vol. 4, pp. 79-93, 2021.
22. F. Salamsi and J.P. Abraham, Effect of Embankment Soil Layers on Stress-Strain Characteristics, *Recent Progress in Plant and Soil Research*, Vol. 4, pp. 68-84, 2021
23. F. Salamsi and J.P. Abraham, Study on the Effect of Inclination of Cutoff Wall Beneath Gravity Dams on Uplift Force, in *Novel Perspectives of Engineering Research*, Vol. 1, pp. 38-57, 2021.
24. J.P. Abraham, S. Bhattacharya, L. Cheng, and J.M. Gorman, A Brief History of and Introduction to Computational Fluid Dynamics, in *Computational Fluid Dynamics*, edited by: Suvanjan Bhattacharya, published by IntechOpen, 2021.
25. F. Salamsi and J.P. Abraham, The Method of Characteristics Applied to the Sensitivity Analysis for Water Hammer Problems, *New Approaches in Engineering Research*, B.P. International, Vol. 9, pp. 50-63, 2021.
26. J. Gorman, S. Bhattacharya, J.P. Abraham, L. Cheng, Turbulence Models Commonly used in CFD, in: *Computational Fluid Dynamics*, edited by: Suvanjan Bhattacharya, published by IntechOpen, 2021.
27. 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.
28. 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.
29. 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.
30. 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.
31. 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.
32. 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.

33. M.W. Dewhurst, 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.
34. 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.
35. 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.
36. 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.
37. 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.
38. 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 (author of 271 journal papers)**

**2023**

1. R. Daneshfaraz, E. Aminvash, S. Veli, M. Rezair, A. Ghaderi, and J.P. Abraham, Experimental Study of New Green and Non-Structural Materials Effects on Scour Reduction Downstream of a Screen, Water, Infrastructure, Ecosystems, and Society, (accepted).
2. S. Abbasi, M. Seifollahi, R. Daneshfaraz, F. Mohammadi, J.P. Abraham, and H. Abbaszadeh, Estimation of Vertical Settlement of Earthen Dams Caused by Earthquake Using ANN Model and Wavelet-ANN Composition, Geotechnical and Geological Engineering, (in press), 2023.
3. S. Abbasi, S. Ravaz, M. Heidapour, R. Daneshfaraz, J.P. Abraham, Investigating and Comparing the Performance of Collar and Cable Composition on Scouring of Cylindrical Bridge Piers, Sadhana Academy Proceedings in Engineering Sciences, (accepted).
4. A. Aghdam, F. Salamsi, A. H. Zadeh Dalia, A. Abbaspoour, and J.P. Abraham, Experimental and Numerical Investigation of the Trajectories of Free and Pressurized Jets Through Storage Dams, *Water Supply*, Vol. 23, paper no. 1297, 2023.
5. Y. Pan L. Cheng, K. von Schuckmann, K.E. Trenberth, G. Li, J.P. Abraham, Y. Liu, V. Gouretski, Y. Yu, H. Liu, C. Liu, Annual Cycle in Upper Ocean Heat Content and the Global Energy Budget, *J. Climate*, (accepted).
6. M. Haghdoost, E. Lakzian, R. Norouzi, J.P. Abraham, S. Sajjadi, and J. Ahadiyan, Numerical Simulation Using the Finite Element Method to Investigate the Effect of Internal

- Cutoff Walls on Seepage and Hydraulic Gradients in Homogeneous Earth Dams, Modeling Earth Systems and Environment, (in press), doi: 10.1007/s40808-023-01755-w, 2023.
7. D.K. Vishwakarma, S. Bhattacharya, M.K. Sonja, and J.P. Abraham, Thermal and Flow Analysis of Air in a Uniformly Heated Channel with an Inlet Flap Obstruction in Laminar, Transitional, and Turbulent Flow Regimes, *Heat Transfer Engineering* (accepted).
  8. F. Salamsi, F. Nahrain, J.P. Abraham, and A.T. Aghdam, Prediction of Discharge Coefficients for Broad-Crested Weirs Using Expert Systems, *Journal of Hydraulic Engineering*, Vol. 29, pp. 1-11, 2023.
  9. J.P. Abraham, T. Wei, L. Cheng, Validation of a New Method of Providing Case-Specific Time-of-death Estimates Using Cadaver Temperatures, *Journal of Forensic Science*, (in press).
  10. F. Salamsi and J.P. Abraham, Hydraulic Characteristics of Flow Over Stepped and Chute Spillways (Case Study: Zirdan Dam), *Water Supply*, Vol. 23, pp. 851-866, 2023.
  11. M. Seifollahi, S. Abbasi, A. Pourtaghi, R. Daneshfaraz, and J.P. Abraham, Performance Efficiency of Data-Based Hybrid Intelligent Approaches to Predict Crest Settlement in Rockfill Dams, *Arabian Journal of Geosciences*, Vol. 15, paper 1701, 2023.
  12. M. Naghavi, M. Mohammadi, G. Mahtabi, and J.P. Abraham, Experimental Assessment of Velocity and Bed Shear Stress in the Main Channel of a Meandering Compound Channel with One-Sided Blocks in Floodplain, *Journal of Hydrology*, (accepted).
  13. T. Wei and J.P. Abraham, Comment on the Marshall-Hoare-Henssge Model for Estimating the Time Since Death, *Journal of Forensic Science*, (accepted).
  14. R. Daneshfaraz, R. Norouzi, P. Ebadzadeh, S. Di Francesco, J.P. Abraham, Experimental Study of Geometric Shape and Sill of Sill Effects on the Hydraulic Performance of Sluice Gates, *Water*, Vol. 15, paper no. 314.
  15. L. Cheng, J.P. Abraham, K.E. Trenberth, J.T. Fasullo, T. Boyer, M.E. Mann, J. Zhu, F. Wang, R. Locarnini, Y. Li, B. Zhang, F. Yu, L. Wan, X. Chen, X. Song, Y. Liu, F. Reseghetti, S. Simoncelli, V. Gouretski, G. Chen, A. Mishonoc, J. Reagan, and G. Li, Another Year of Record Heat for the Oceans, *Advances in Atmospheric Sciences*, (in press).
  16. A.T. Aghdam, A. Hosseinzadeh, F. Salamsi, A. Abbaspour, and J.P. Abraham, Numerical and Experimental Study of Trajectory for Free Falling Jets, *Iranian Journal of Science and Technology*, (in press).
  17. Y. Pan, L. Cheng, K. von Schuckmann, K.E. Trenberth, B. Li, J.P. Abraham, Y. Li, V. Gouretski, Y. Yu, H. Liu, and C. Lei, Annual Cycle in Upper Ocean Heat Budget Content and Global Energy Budget, *Journal of Climate* (submitted).
  18. T. Wei, J.P. Abraham, and Y. Wang, New Temperature and Heat Loss Charts for One-Dimensional, Transient Heat Conduction, *Journal of Heat Transfer*, Vol. 145, paper no. 014502, 2023.



19. L. Cheng, K. von Schuckmann, J.P. Abraham, K. Trenberth, M. Mann, L. Zanna, M.H. England, J. D. Zika, J. Fasullo, Y. Yu., Y. Pan, J. Zhu, E. Newsom, B. Bronselaer, and X. Lin, Past and Future Warming, *Nature Reviews Earth and Environment*, Vol. 3, pp. 778-794 (Altmetric – 595, May 2023, top 1% of similar papers).
20. F. Salamsi, P. Sihag, J.P. Abraham M. Nouri, Experimental Investigation and Prediction of Free Fall Jet Scouring Using Machine Learning Models, *International Journal of Sediment Research*, Vol. 38, pp. 1-20, 2022.
21. R. Daneshfaraz and J.P. Abraham, Laboratory Study of Energy Dissipation on Gabion Vertical Drop, *Innovative Infrastructure Solutions*, Vol. 7, article number 328, 2022.
22. J.P. Abraham and L. Cheng, Intersection of Climate Change, Energy, and Adaptation, *Energies*, Vol. 15, paper no. 5886, 2022.
23. Y. Wang, H. Wan, T. Wei, and J.P. Abraham, Enhancement of Heat and Mass Transfer By Herringbone Microstructures in a Simple Shear Flow, *Physics of Fluids*, Vol. 34, paper no. 082012, 2022.
24. M. Seifollahi, S. Abbasi J.P. Abraham, R. Norouzm R. Daneshfaraz, M-A. Lotfollahi-Yaghin, and A. Alkan, Optimization of Gravity Concrete Dams Using the Grasshopper Algorithm (Case Study: Koyna Dam), *Geotechnical and Geological Engineering*, Vol. 40, pp. 5481-5496, 2022.
25. T. Tian, L. Cheng, G. Wang, J.P. Abraham, J. Zhu, J. Song, and H. Leng, Reconstructing High-Resolution Ocean Subsurface Salinity State Using Machine Learning Approach, *Earth System Science Data* (in press).
26. J.P. Abraham, L. Cheng, M.E. Mann, K.E. Trenberth, K. von Schuckmann, The Ocean Response to Climate Change Guides Both Adaptation and Mitigation Efforts, *Atmospherical and Oceanic Science Letters*, Vol. 15, paper no. 100221, 2022.
27. R. Biabani, F. Salamsi, M. Npouri, and J.P. Abraham, Flow Over Embankment Gabion Weirs in Free Flow Conditions, *Journal of Hydro-Environmental Research*, Vol. 44, pp. 65-76, 2022.
28. B. Nourani, F. Salamsi, H. Arvanaghi, and J.P. Abraham, Development of Explicit Formulas for Estimating Seepage Characteristics Underneath Aprons with Equal and Unequal End Vertical Double-Piles, *International Journal of Geomechanics*, Vol. 22, paper no. 04022237, 2022.
29. L. Cheng, G. Foster, Z. Hausfather, K.E. Trenberth, J.P. Abraham, Improved Quantification of the Rate of Ocean Warming, *Journal of Climate*, Vol. 35, pp. 4827-4840, 2022.
30. F. Salamsi and J.P. Abraham, Effect of Slope on Energy Dissipation for Flow Over a Stepped Spillway, *Water Supply*, Vol. 22, pp. 5056-5069, 2022.

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### Conference Presentations and Public Lectures (147 presentations)

1. J.P. Abraham, Heat Transfer in Forensics, VCU Forensics Seminar, December 6, 2022.
2. L. Cheng, and J.P. Abraham, Perspectives on Ocean sand Their Role in the Global Energy Budget and Water Cycle, *American Meteorological Society 102<sup>nd</sup> Annual Meeting, Houston, Kevin Trenberth Symposium*, January 23-27, 2022 (invited).

3. L. E. Olsen and J.P. Abraham, New correlations for convective coefficients over square and cubical bodies, *48<sup>th</sup> National Conference on fluid mechanics and fluid power*, December 27-29, 2021.
4. D. Vishwakarma, S. Bhattacharyya, M. Soni and J.P. Abraham, Effect of Inlet Flat Obstruction on Thermohydraulic Characteristics in a Smooth Circular Tube in the Transition Flow Regime, *48<sup>th</sup> National Conference on fluid mechanics and fluid power*, December 27-29, 2021.
5. J.P. Abraham, Introduction to the Computational Tools Available in Fluid Mechanics and Heat Transfer Research, *National Workshop on Research Methodology in Fluid Mechanics*, Pilani, India, June 7-9, 2021.
6. L. Cheng, K. Trenberth, N. Gruber, M.E. Mann, J.P. Abraham, and J. Fasullo, Improved Estimates of Changes in Upper Ocean Salinity and Water Cycle, *AGU Fall Meeting*, 2020.
7. J.P. Abraham, The Science of Global Warming – What do we really know? *Presented at New Mexico Tech. Lecture Series*, September 24, 2020.
8. L. Cheng, K. Trenberth, K. von Schukmann, J.P. Abraham, V. Gouretski, Oceanic Responses to the Climate: Recognizing Changes and Extremes, *AAAS Annual Meeting*, February 11, 2021.
9. J.P. Abraham, Advanced Methods in Thermal Engineering, *International Workshop on Recent Advances in Thermal Engineering*, India, June 29-July 3, 2020.
10. J.P. Abraham, L. Cheng, Kevin Trenberth – A Life of Research and Impact, *Trenberth Symposium*, Denver, CO, March 16, 2020.
11. J.P. Abraham, Modern Climate Change, *Threats to the World's Oceans – World Ocean Day*, Minneapolis, MN June 8, 2020.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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.

17. 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.
18. 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.
19. J.P. Abraham, Progress in XBT simulations, *Presented at the Institute of Atmospheric Physics*, Beijing, October 23, 2018.
20. J.P. Abraham, B.D. Plourde, J.R. Stark, Modeling Hemodynamics Through Lesions *Cardiovascular Research Technologies Conference 18*, Washington DC., March 3-6, 2018.
21. 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.
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26. 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.
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28. 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.
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35. R. Cowley, L. Cheng, G. Goni, T. Boyer, J.P. Abraham, S. Wijffels, V. Gouretski, F. Reseghetti, S. Kizu, S. Dong, F. Bringas, M. Goes, L. Houpert, J. Sprintall, J. Zhu, Towards Reducing Uncertainty in Historical XBT Data: An International Effort from the XBT Science Team, *2016 Ocean Sciences Meeting*, New Orleans, LA, February 21-26, 2016.
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42. L. Cheng, J. Zhu, and J.P. Abraham, An Updated Estimate on Global Upper Ocean Heat Content Change and the Remaining Challenges, *American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18, 2015.
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44. J.P. Abraham, Small-scale Wind Turbines: Design, Analysis and Applications, *Hong Kong University*, January 28, 2015 (invited).



45. J.P. Abraham, The Science of Climate Change, What Do We Really Know, *Hong Kong University of Science and Technology*, January 26, 2015 (invited).
46. J.P. Abraham et al., A Novel Multi Lumen Compliant Balloon Catheter (ND® 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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53. J.P. Abraham, The Science of Climate Change (Keynote), *2014 Summer Institute for Climate Change and Energy Education*, Sandstone, MN, August 4-6, 2014.
54. 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.
55. 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.
56. 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.

57. J.P. Abraham, The Science of Global Warming, What Do We Really Know (Keynote), *Audubon Society National Meeting*, October 6, 2013.
58. J.P. Abraham, Thawing Out Climate Science, IEEE 2013 Awards Banquet, St. Paul, MN, February 23, 2013.
59. J.P. Abraham, Using ANSYS to Model Rotating Oceanographic Devices, *ANSYS Regional Conference*, Minneapolis, June 6, 2013.
60. 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.
61. J.P. Abraham, Measurements of the Earth's Climate System, *IEEE Conference on Instrumentation and Measurement Technology Conference*, Minneapolis, MN, May 6, 2013.
62. J.P. Abraham, Numerical Simulations of Drug Deposition of Paclitaxel, *Design of Medical Devices Conference*, 2013, Minneapolis, MN, April 8-11, 2013.
63. 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.
64. 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.
65. 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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67. 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.
68. J.P. Abraham, Understanding Climate Change's Common Myths, *Minnesota Broadcast Meteorologists Climate Change Science Seminar*, St. Paul, MN, October 5-6, 2012.
69. 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.
70. 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.

71. 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.
72. 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.
73. K.E. Trenberth, K. Emanuel, J.P. Abraham, Climate Science and Meteorology, *AMS National Broadcast Meteorology Conference*, Boston, MA, August 24, 2012
74. 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.
75. J.P. Abraham, Climate Myths, Misconceptions, and Their Creators, American Chemical Society, St. Paul, MN, November 13, 2012.
76. I. Enting, J.P. Abraham, Detailed Debunking of Denial, *AGU Winter Meeting 2012*, December 3-7, San Francisco, 2012.
77. 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.
78. 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.
79. 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.
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84. 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.
85. 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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88. 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.
89. 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.
90. 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.
91. 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.
92. 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.
93. 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.
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95. 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.

96. 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.
97. 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.
98. 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.
99. 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.
100. 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.
101. 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.
102. 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.
103. 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.
104. 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.
105. 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.
106. 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.
107. B. D. Plourde, J.P. Abraham, G.S. Mowry, Numerical Simulation of Vertical Axis Wind Turbines, *ANSYS Users Conference*, Minneapolis, MN, June 11, 2010.
108. 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.

109. 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.
110. 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.
111. 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.
112. E.M. Sparrow and J.P. Abraham, Numerical Solutions of Biological Heat Transfer, *Design of Medical Devices Conference*, Minneapolis, MN April 13-15, 2010.
113. 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.
114. 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.
115. 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.
116. 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.
117. 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.
118. 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.
119. 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.
120. 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.

121. 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.
122. 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.
123. 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.
124. J.P. Abraham, Integrating Integration of ANSYS/CFX into Classrooms, *ANSYS International*, Pittsburgh, PA, August 26-29, 2008.
125. J.P. Abraham, Pressure Drop and Heat Transfer Calculations for Laminar-Turbulent Intermittent Flows, *ANSYS International*, Pittsburgh, PA, August 26-29, 2008.
126. 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.
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128. 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.
129. 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.
130. 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).
131. 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.
132. John Abraham, Computation Fluid Dynamics Using ANSYS CFX, presented at the University of Minnesota Digital Technology Center, Sept. 12 and 14, 2006.
133. John Abraham, Application of the Finite Element Method, *LifeSciences Conference*, Minneapolis, October 5, 2006.
134. John Kim and John Abraham, Design of Experiments in the Medical Device Industry, *LifeSciences Conference*, Minneapolis, October 5, 2006.

135. 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.
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137. John Abraham, Nick Whitehead, and Ephraim Sparrow, Biomedical Applications Simulations/Experimental Investigations, *Biomedical Focus 2006*, Brooklyn Center, MN, March 20-21, 2006.
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141. 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.
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143. 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.
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**Granted Patents (author of 16 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.
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8. B.R. Plourde, J. P. Abraham, D.R. Plourde, R. Pakonen, "Dual Axis Tracking Method", U.S. Patent 10,890,645.
9. 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. (Patent granted, number forthcoming).
10. B.D Plourde, J.P. Abraham, D. Plourde, R. Pakonen, A. Gikling, N. Naughton, Fluid Heating system, European Patent, granted, number forthcoming, 2021.
11. B. D. Plourde, J. P. Abraham, D.R. Plourde, R. Pakonen, "Method of Calculating Pathogen Inactivation for a Fluid Heating System", US Patent, 11,255,804.
12. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, "Digital Fluid Heating System", China National Intellectual Property Administration, Chinese Application Number 201780083752.0
13. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, "Digital Fluid Heating System", African Regional Intellectual Property Organization (ARIPO), (patent granted, number forthcoming).
14. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, "Digital Fluid Heating System", European Union number EP 4,080,134.
15. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, "Digital Fluid Heating System", European Union number EP3,542,107.
16. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, "Digital Fluid Heating System", Columbia, Application number NC 2019/00006027, (*number to be issued*).

17. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, and D. Plourde, Solar Heating for Refrigeration and Fluid Heating Devices, Colombian Application No. 2019/0011368, (number to be issued).

**Pending Patents**

1. 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.
2. B.D. Plourde, J.P. Abraham, “Solar Heating System”, US Patent Application No. 62/423,814 (filed November 18, 2016).
3. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, “Solar Heating for Refrigeration and Fluid Heating Devices”, filed March 2018. US Application number 20180266712.
4. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, “Dual-Axis Tracking Method”, US Application number 2019/0107598, filed November 2018.
5. B.D. Plourde, A. Gikling, J.P. Abraham, R. Pakonen, “Digital Fluid Heating System”, US Application number 2018/0142905, filed November 2017.

**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.

**Editorial Board Member**

18. International Society of Cardiovascular Translational Research, 2020-present
19. Energies, Thermal Management, 2019-present
20. Cardiovascular Revascularization Medicine, 2018-present
21. Stem Cell Biology and Transplantation, 2015-present
22. Associate Editor, NCSE, Climate Science, 2012-present
23. International Journal of Mechanics and Energy, 2012-present
24. Open Mechanical Engineering Journal, 2007-present
25. Open Mechanical Engineering Reviews, 2007-present
26. Open Mechanical Engineering Letters, 2007-present
27. Open Medical Devices Journal, 2008-present
28. Creative Engineering Journal, 2009-present
29. ISRN Applied Mathematics, 2011-present
30. International Journal of Sustainable Energy, 2012 - present
31. International Journal of Materials, Methods, and Technologies, 2012- present

**CONSULTANTSHIPS**

**GRANTS (funding \$24.02 million)**

<i>Varian Medical Systems</i>	<b>2023-present</b>
<i>Flotherm</i>	<b>2021-present</b>
<i>LEMA, LLC, MN</i>	<b>2016-present</b>
<i>HRST, Inc., MN</i>	<b>2021</b>
<i>Biotronik</i>	<b>2021</b>

<i>Starky</i>	2020
<i>Marvin Windows</i>	2020-2022
<i>Cardiovascular Systems, Inc.</i>	2019-2021
<i>ALS Consulting</i>	2019
<i>Medivator, MN</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>	2014-2022
<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>	2008-2
<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
<i>Johnson and Johnson, Newark, NJ</i>	2004-2005
<i>Cortron/XeteX, Fridley, MN</i>	2005
<i>MicroControl Company, MN</i>	circa 2001
<i>Donaldson Co., Bloomington, MN</i>	1999-2003
<i>Augustine Medical, Eden Prairie, MN</i>	2000-2003
<i>Midmac Systems Inc., St Paul, MN</i>	2002
<i>Remmele Engineering Inc., St Paul, MN</i>	2002-2005
<i>Urologix, Minneapolis, MN</i>	circa 2004
<i>Restore Medical, Minneapolis, MN</i>	circa 2002
<i>Jennio, Minnesota</i>	circa 2001
<i>Caterpillar, Minneapolis, MN</i>	circa 2000
<i>ADC telecom, Minneapolis, MN</i>	circa 2000

<i>Entropy Solutions</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 \$24.02 million)**

<b>Varian Medical Systems, Inc.</b>	<b>2023</b>
Brain thermal transport, oncology applications	

<b>LEMA, LLC</b>	<b>2016-2022</b>
\$20m for development and deployment of solar-power off grid systems. Part of Consolidated Appropriations Act, 2023	

<b>HRST, Inc.</b>	<b>2021</b>
\$34,000 for analysis of flow patterns in power plants	

<b>Biotronik</b>	<b>2021</b>
\$44k for simulation of heating caused by implanted medical devices	

<b>Flotherm (SBIR award FAIN 2034065)</b>	<b>2020-2023</b>
\$20k for simulation of body-heating devices	
\$48k for simulation of body-heating devices	
SBIR funding, NSF Small Business Innovative Research project	

<b>Starky</b>	<b>2019-2020</b>
\$6k for thermal modeling of hearing aid batteries	

<b>National Science Foundation (Co-PI, FAIN = 2018403)</b>	<b>2020-2021</b>
\$424k for engineering PIV instrumentation	

<b>Intertek</b>	<b>2019-2020</b>
\$13k for study of tissue surrogates for biological heating	

<b>Cardiovascular Systems, Inc.</b>	<b>2019-2021</b>
\$13k for thermal model of blower impellor for a dialysis pump	
\$9k for thermal model of blower impellor for a dialysis pump	
\$4k for thermal model of blower impellor for a dialysis pump	
\$20k for flow model of blower impellor for a dialysis pump	
\$5k for flow model of blower impellor for a dialysis pump	

<b>ALS Consulting</b>	<b>2019</b>
\$15k for thermal model of power plant	

<b>Medivators</b>	<b>2019</b>
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\$12k for thermal model of thermal sterilization	
<b>Marvin Windows</b>	<b>2019-2022</b>
\$4k for thermal analysis of a tiny home	
\$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>2018-2020</b>
\$6k to research thermal processes during window ventilation	
\$4k to research thermal processes of natural lighting	
\$4k to research thermal processes of natural lighting	
<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>	2016-2017
\$14k for analysis of food frier	
\$15k for analysis of a food processing device	
<b>EKOS</b>	2017
\$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>	2016
\$15k for analysis of fluid flow in power plants	
<b>Precision Air</b>	2016
\$1600 for simulation of airflow in operating rooms	
<b>Medtronic</b>	2016
\$12k for simulation of tissue temperatures during transcutaneous recharge	
<b>3M</b>	2015
\$12k to simulate airflow in ultra-clean operating rooms.	
<b>Cardiovascular Systems, Inc.</b>	2015-2016
\$8,000 for the study of deformable arteries	
\$6,000 for biological flows and impellor design	
<b>AF Energy</b>	2015
\$3000 wind turbine calculations	
<b>Intellectual Ventures Laboratory</b>	2015
\$2000 wall condensation calculations	
<b>Medivators</b>	2015
\$4000 for flow and pressure calculations medical chamber.	
<b>Floursecence, Inc.</b>	2015
\$2,000 designing biological heater for cell environments	
<b>Mador Technologies</b>	2015
\$20,000 analyzing a liquid nitrogen water condensation device	
<b>Koronis Biomedical Technologies</b>	2015
\$5,000 simulation of fluid flow	
<b>Mador Technologies</b>	2014-2015
\$8,000 analyzing a liquid nitrogen water condensation device	
<b>National Resources Defense Council</b>	2015

\$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>
\$1.5m 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	
<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>	2012
\$7000 for study of thermoelectric technologies to power implants	
<b>HRST, Inc.</b>	2012
\$4300 for analysis of perforated plates for flow uniformity	
<b>Energy Foundation</b>	2012-2013
\$30k developing climate-science communication strategies	
<b>CriticCare</b>	2012
\$4,275 for numerical modeling of accelerated aging of medical devices.	
<b>HRST, Inc.</b>	2012
\$5,540 for research study on mixing efficiency in heat recovery plants.	
<b>Windstrip, LLC</b>	2009-2013
\$1m for development of vertical axis wind turbines to power cellular communication equipment.	
<b>QiG Group</b>	2011-2012
\$20k for study of implant heating of biological tissue	
<b>Phraxis</b>	2011-2012
\$8,000 for the analysis of blood flow through an AV shunt	
<b>Energy Foundation</b>	2011-2012
\$71k developing climate-science communication strategies	
<b>Cardiovascular Systems, Inc.</b>	2011
\$23k for the study of paclitaxel distribution techniques.	
<b>Cardiovascular Systems, Inc.</b>	2011
\$5,000 for the study of temperature management in palleted products	
<b>Galil Medical</b>	2011
\$9,000 for the kidney tumor cryosurgical devices.	
<b>Multiple groups</b>	2010
\$13,000 for installation of solar panels in Uganda	
<b>Imation</b>	2010
\$10k for the design of a polymeric extrusion die	
<b>Cypress Wind</b>	2010
\$30.6k for the development of a vertical axis, small-footprint wind turbine.	
<b>Cypress Wind</b>	2009
\$27k for the development of a vertical axis, small-footprint wind turbine.	
<b>Cardiovascular Systems, Inc.</b>	2009
\$80k for the study of cavitation and bolus formation during orbital atherectomy procedures.	



<b>Medtronic, Inc.</b>	
\$65k for analysis of subdermal heating associated with recharge of neuromodulation systems.	<b>2008-2011</b>
<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>
\$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	
Thermal analysis of liquid-based cold plates for cooling naval radar	
<b>MicroControl Company</b>	<b>Circa 2001</b>

Analysis of burn-in board devices	
<b>Jennio</b>	<b>circa 2001</b>
Analyzed devices that handle, transport, and cool turkey carcasses during processing.	
<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>Entropy Solutions</b>	<b>circa 2000</b>
Design and Analysis of insulation and phase change thermal management for shipping containers	
<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 packageing	
<b>Principal Investigator – Supercomputing Institute</b>	<b>2002-2012</b>
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.	
<b>Principal Investigator – ASHRAE Project Grant Program</b>	<b>2003</b>
Awarded a \$5,000 grant funded by ASHRAE to investigate the efficacy of rotating-wheel heat and moisture exchangers.	
<b>Faculty Advisor – Bush Grant, Young Scholars Program</b>	<b>2002</b>
Faculty advisor for a \$3,000 grant for undergraduate research of air-jet heat transfer for surgical applications.	
<b>Faculty Advisor – Bush Grant, Young Scholars Program</b>	<b>2002</b>
Faculty advisor for a \$3,000 grant for undergraduate research to encourage American Indian students to pursue careers in science and technology.	
<b>A Multi-Function Heat Exchanger for Control of Temperature, Moisture, and Air Quality</b>	<b>1997-2000</b>
Project Engineer for \$475K SBIR grants awarded by NSF, grant nos. 9660900 and 9801062	