

Teaching Experience

- Instructed the range of courses in thermal sciences/systems and their laboratories at both undergraduate and graduate levels.
- Developed new mixed grad-undergrad course: Intermediate Fluid Mechanics; Graduate Courses: Conduction and Advanced Fluid Mechanics.
- Applied modern teaching pedagogies using a blend of delivery techniques, obtaining excellent students evaluations- average for past few years: 4.6/5.
- Assessed and documented learning outcomes for accreditation and continuous improvement purposes.
- Upgraded and added new projects, exercises and experiments to enhance undergraduate teaching labs in thermal sciences.
- Conducted research and disseminated new knowledge in engineering education and its pedagogies.
- Continued self-improvement in teaching by monitoring engineering education research, attending conferences and seminars about teaching and learning engineering.

Research Experience and Scholarship

Research Impact (Google Scholar, Jan. 2022)

Citations: 2299

I10-index: 44

h-index: 25

Sinopsis

2001 to present

- Launched new timely research programs employing metal foam to:
 - enhance heat transfer by combining it with nano and hybrid nano fluids- Pending NSF proposal
 - cool and reduce the cost and weight of bipolar plates of proton exchange membrane fuel cells (PEM)
 - provide thermal management of high-power electronics- Collaboration with Virginia Tech's NSF Center for Power Electronics and Systems
 - protect novel electronic systems against overheating in the new electric vehicle architecture- Collaboration with Ford Motor Company- Pending University Research Program proposal; with a Ford internal champion
- Secured funding for graduate and undergraduate research through grant writing to government agencies and the industry
- Built an international reputation as an expert in metal foam technology
- Embarked on an interdisciplinary research and development thrust for studying interpenetrating phase composites comprised of metal foam and polymers for use in future automobiles as a structural material. Funded by Ford Motor Company

Publications

Books

- (book) Proceedings of the 11th International Conference on Porous Metals and Metallic Foams (MetFoam 2019), **N. Dukhan Editor**, 2020, Springer, Cham, Switzerland, The

Minerals, Metals & Materials Series. ISBN 978-3-030-42797-9 ISBN 978-3-030-42798-6 (eBook) <https://doi.org/10.1007/978-3-030-42798-6>

- Metal Foam: Fundamentals and Applications, **N. Dukhan, Editor**, DEStech Publications, Lancaster, PA, 2013. ISBN: 978-1-60595-014-3

Book Chapter

- Dukhan, N., Chen-Wiegart, Y., Puente, A., Erdeniz, D., & Dunand, D. (2020). Introduction: Porous Metals: from Nano to Macro, Focus Issue: Journal of Materials Research, 35(19), 2529-2534. doi:10.1557/jmr.2020.282

Refereed Journals

1. **N. Dukhan**, "Equivalent Parallel Strands Modeling of Highly-Porous Media for Two-Dimensional Heat Transfer: Application to Metal Foam," Special Issue: Advances of Heat Transfer in Porous Media, *Energies* 2021, 14(19), 6308; <https://doi.org/10.3390/en14196308>. (Invited)
2. **N. Dukhan** and A. A. Hmad, "Thermal Management of Fuel-Cell Stacks Using Air Flow in Open-Cell Metal Foam," *International Journal of Thermal Science*, 2021, 10.1016/j.ijthermalsci.2021.107370.
3. A. A. Hmad and **N. Dukhan**, "Cooling Design for PEM Fuel-Cell Stacks Employing Air and Metal Foam: Simulation and Experiment," *Energies* 14(9). doi.org/10.3390/en14092687, Special Issue: "Design, Modeling, and Optimization of Novel Fuel Cell Systems, May, 2021 (Invited)
4. A. Arbak and **N. Dukhan**, "Performance and Heat Transfer Measurements in Asymmetrically-Heated Metal Foam Cooled by Water," *Thermal Science and Engineering Progress*, Volume 20, 1 December 2020, <https://doi.org/10.1016/j.tsep.2020.100688>.
5. Y. Awin and **N. Dukhan**, "Experimental Performance Assessment of Metal-Foam Flow Fields for PEM Fuel Cells," *Applied Energy*, doi.org/10.1016/j.apenergy.2019.113458, Vol. 252, 15 October 2019, 113458.
6. **N. Dukhan** and Ö. Bağcı and A. Arbak, "The Role of Pore Size in Heat Transfer of Oscillating Liquid Flow in Metal Foam," *International J. Thermal Sciences*, Vol. 145, DOI: 10.1016/j.ijthermalsci.2019.105978, June, 2019.
7. Ö. Açıkgöz, Y. Karakoyun, **N. Dukhan**, A. S. Dalkılıç, "Realistic Experimental Heat Transfer Characteristics of Radiant Floor Heating Using Sidewalls as Heat Sinks," *Energy and Buildings*, Vol. 183, January 15, 2019, pp. 515-526.
8. Ö. Bağcı, and **N. Dukhan**, "Impact of Pore Density on Oscillating Liquid Flow in Metal Foam," *Experimental Thermal and Fluid Science*, Volume 97, Oct 1, 2018.
9. Ö. Bağcı, A. Arbak; M. De Paepe and **N. Dukhan**, "Investigation of Low-Frequency-Oscillating Water Flow in Metal Foam with 10 Pores per Inch," *Heat and Mass Transfer*, Volume 54, No. 8, 2343-2349. doi: doi.org/10.1007/s00231-018-2281-y, August, 2018, pp. 2343—2349.
10. A. Arbak, **N. Dukhan**, Ö. Bağcı, and M. Özdemir, "Influence of Pore Density on Thermal Development in Open-Cell Metal Foam," *Experimental Thermal and Fluid Science*, Vol. 86, 2017, pp.180–188.

11. **N. Dukhan** and A. S. Suleiman, "The Thermally-Developing Region in Metal Foam with Open Pores and High Porosity," *Thermal Science and Engineering Progress*. Vol. 1, March 2017, pp. 88-96
12. A. Arbak, Ö. Bağcı, **N. Dukhan**, "Flow Regimes in Commercial Metal Foam Having 10 Pores per Inch," *Journal of Thermal Engineering*, Vol. 2, Issue 6, 2016, pp.1023-1028
13. Ö. Bağcı and **N. Dukhan**, "Experimental Hydrodynamics of High-Porosity Metal Foam: Effect of Pore Density," *International Journal of Heat and Mass Transfer*, Vol. 103, 2016, pp. 879-885, DOI: 10.1016/j.ijheatmasstransfer.2016.07.097
14. Ö. Bağcı, **N. Dukhan**, M. Özdemir and L.A. Kavurmacioğlu, "Experimental Heat Transfer Due to Oscillating Water Flow in Open-Cell Metal Foam," *International Journal of Thermal Science*, Vol. 101, 2016, pp. 48-58.
15. **N. Dukhan**, Ö. Bağcı, M. Özdemir and L. A. Kavurmacioğlu, "Experimental Fully-Developed Thermal Convection for Non-Darcy Water Flow in Metal Foam," *Journal of Thermal Engineering*, Vol. 2, Issue 2, April 2016, pp. 677-682.
16. Ö. Bağcı, **N. Dukhan** and L. A. Kavurmacioğlu, "Forced-Convection Measurements in the Fully-Developed and Exit Regions of Open-Cell Metal Foam," *Transport in Porous Media*, Vol. 109, No. 2, 2015, pp. 513-526. DOI: 10.1007/s11242-015-0534-5
17. **N. Dukhan**, Ö. Bağcı and L. A. Kavurmacioğlu, "Effect of Frequency on Heat Transfer Due to Oscillating Water Flow in Open-Cell Metal Foam: An Experimental Study," *Experimental Thermal and Fluid Science*, Vol. 66, 2015, pp. 97 – 105.
18. **N. Dukhan**, Ö. Bağcı, M. Özdemir, "Thermal Development in Open-Cell Metal Foam: An Experiment with Constant Wall Heat Flux," *Int. Journal of Heat Mass Transfer*, Vol. 85, March, 2015, pp. 852-859, DOI: 10.1016/j.ijheatmasstransfer.2015.02.047
19. Ö. Bağcı, **N. Dukhan**, M. Özdemir, "Various Flow Regimes and Permeabilities for Packed-Spheres Porous Media," *Defect and Diffusion: Recent Developments of Diffusion Processes and Their Applications: Fluid, Heat and Mass*, Vol. 364 (Special Volume), 2015, pp. 1-8. Doi: 10.4028/www.scientific.net/DF.4.1.
20. Ö. Bağcı, **N. Dukhan**, M. Özdemir, "Characteristics of Oscillating Liquid Flow in Foam-Like Highly-Porous Media: An Experimental Study," *Experimental Thermal and Fluid Science*, Vol. 60, 2015, pp. 96 -105. DOI: 10.1016/j.expthermflusci.2014.09.002
21. **N. Dukhan**, Ö. Bağcı, M. Özdemir, "Metal Foam Hydrodynamics: Flow Regimes from Pre-Darcy to Turbulent," *Int. Journal of Heat and Mass Transfer*, Vol. 77, 2014, pp. 114–123, DOI: 10.1016/j.ijheatmasstransfer.2014.05.017.
22. Ö. Bağcı, **N. Dukhan** and M. Özdemir, "Flow Regimes in Packed Beds of Spheres from Pre-Darcy to Turbulent," *Transport in Porous Media*, Vol.104, No. 3, pp. 501-52. DOI: 10.1007/s11242-014-0345-0
23. **N. Dukhan**, Ö. Bağcı, M. Özdemir, "Experimental Flow in Various Porous Media and Reconciliation of Forchheimer and Ergun Relations," *Experimental Thermal and Fluid Science*, Vol. 57, 2014, pp. 425–433, DOI: 10.1016/j.expthermflusci.2014.06.011
24. A.S. Suleiman and **N. Dukhan**, "Forced Convection inside Metal Foam: Simulation over a Long Domain and Analytical Validation," *Int. Journal of Thermal Science*, Vol. 86, 2014, pp. 104–114.
25. A.S. Suleiman and **N. Dukhan**, "Long-Domain Simulation of Flow in Open-Cell Metal Foam and Direct Comparison to Experiment," *Microporous and Mesoporous Materials*, Vol. 196C, 2014, pp. 104-114, DOI: 10.1016/j.micromeso.2014.05.003
26. **N. Dukhan** and A. S. Suleiman, "Simulation of Entry-Region Flow in Open-Cell Metal Foam and Experimental Validation," *Transport in Porous Media*, Vol. 101, Issue 2, 2014, pp. 229-246. DOI 10.1007/s11242-013-0241-z

27. N. **Dukhan**, M. A. Al-Rammahi and A. S. Suleiman, "Fluid Temperature Measurements inside Metal Foam and Comparison to Brinkman-Darcy Flow Convection Analysis," *Int. Journal of Heat and Mass*, Vol. 67, 2013, pp. 877-884.
28. N. **Dukhan** and K. Hooman, "Comments on Two Analyses of Thermal Non-equilibrium Darcy-Brinkman Convection in Cylindrical Porous Media," *Int. Journal of Heat and Mass Transfer*, Vol. 66, 2013, pp. 440-443.
29. K. Hooman and N. **Dukhan**, "Theoretical Model to Predict Hydrodynamics of Foams," *Transport in Porous Media*, Vol. 100, 2013, pp.393-406.
30. N. **Dukhan** and S. Bodke, "Metal Foam-PCM Heat Storage Technology: The Charging Scenario," *Electronics Cooling*, June 2012, pp. 8-11.
31. N. **Dukhan** and M. Ali, "Strong Wall and Transverse Size Effects on Pressure Drop of Flow through Open-Cell Metal Foam," *Int. Journal of Thermal Science*, Vol. 57, July 2012, pp. 85-91. DOI: 10.1016/j.ijthermalsci.2012.02.017
32. N. **Dukhan** and M. Ali, "On the Various Flow Regimes in Open-Cell Metal Foam," *International Journal of Transport Phenomena*, Vol. 13, No. 2, 2012, pp. 85-97.
33. N. **Dukhan**, "Analysis of Brinkman-Extended Darcy Flow in Porous Media and Experimental Verification Using Metal Foam," *ASME Journal of Fluids Engineering*, Vol. 134, No. 7, 2012, pp. 071201-1 - 071201-6. DOI: 10.1115/1.4005678 ([top ten downloaded papers in August 2012](#))
34. N. **Dukhan** and M. Ali, "Effect of Confining Wall on Properties of Gas Flow Through Metal Foam: An Experimental Study," *Transport in Porous Media*, Vol. 91, No. 1, 2012, pp. 225-237
35. N. **Dukhan** and K. Patel, "Effect of Sample's Length on Flow Properties of Open-Cell Metal Foam and Pressure-Drop Correlations," *Journal of Porous Materials*, Vol. 18, No. 6, 2011, pp. 655-665
36. N. **Dukhan** and C. A. Minjeur II, "A Two-Permeability Approach for Assessing Flow Properties in Cellular Metals," *Journal of Porous Materials*, Vol. 18, No. 4, 2011, pp. 417-424, DOI: 10.1007/s10934-010-9393-1.
37. N. **Dukhan** and M. Schumack, "Reflection-Based Assessment of Service Learning in Undergraduate Engineering," *International Journal for Service Learning in Engineering*, Vol. 5, No. 2, 2010, pp. 32-43.
38. N. **Dukhan**, N. Rayess and J. Hadley, "Characterization of Aluminum Foam-Polypropylene Interpenetrating Phase Composites: Flexural Test Results," *Mechanics of Materials*, Vol. 42, No. 2, 2010, pp. 134-141.
39. N. **Dukhan**, "An Engineering Estimate for Plug-Flow Convection in Porous Media Discarding Fluid Conduction," *ASME Journal of Electronic Packaging*, Vol. 131, No. 3, 2009, pp. 034501-1 – 034501-3. ([top ten downloaded papers in June 2009](#))
40. N. **Dukhan**, "Developing Non-Thermal-Equilibrium Convection in Porous Media with Negligible Fluid Conduction," *ASME Journal of Heat Transfer*, Vol. 131, No. 1, 2009, pp. 014501-1--014501-3.
41. N. **Dukhan**, M. Schumack and J. Daniels, "Service Learning as Pedagogy for Promoting Social Awareness of Mechanical Engineering Students," *International Journal of Mechanical Engineering Education*, Vol. 37, No. 1, 2009, pp. 78-86.
42. N. **Dukhan**, M. Schumack and J. Daniels, "Implementation of a Service-Learning Component in Engineering and Its Effect on Students' Attitudes and Identity," *European Journal of Engineering Education*, Vol. 33, No. 1, 2008, pp. 21-31.
43. N. **Dukhan**, and P. Patel, "Equivalent Particle Diameter and Length Scale for Pressure Drop in Porous Metals," *Experimental Thermal and Fluid Science*, Vol. 32, 2008, pp. 1059-1067.

44. N. **Dukhan** and K. C. Chen, "Heat Transfer Measurements in Metal Foam Subjected to Constant Heat Flux," *Experimental Thermal and Fluid Science*, Vol. 32, No. 2, 2007, pp 624-631.
45. N. **Dukhan**, M. Schumack, J. Daniels and M. Jenkins, "Service-Learning Case Study in Heat Transfer," *International Journal of Service Learning in Engineering*, Vol. 1, No. 2, 2007, pp. 1-15.
46. N. **Dukhan**, "Correlations for the Pressure Drop for Flow through Metal Foam," *Experiments in Fluids*, Vol. 41, No. 4, 2006, pp. 665-672.
47. N. **Dukhan**, R. Picón-Feliciano and Á. Álvarez-Hernández, "Air Flow through Compressed and Uncompressed Aluminum Foam: Measurements and Correlations," *ASME Journal of Fluids Engineering*, Vol. 128, 2006, pp. 1004-1012.
48. N. **Dukhan**, R. Picón-Feliciano and Á. Álvarez-Hernández, "Heat Transfer Analysis in Metal Foams with Low-Conductivity Fluids," *ASME Journal of Heat Transfer*, Vol. 128, No. 8, 2006, pp. 784-792. ([top ten most downloaded articles, August 2006](#))
49. J. Gonzalez, L. Alva and N. **Dukhan**, "Initial Analysis of PCM Integrated Solar Collectors," *ASME Journal of Solar Energy Engineering*, Vol. 128, No. 2, 2006, pp. 173-177.
50. N. **Dukhan**, P. D. Quiñones-Ramos, E. Cruz-Ruiz, M. Vélez-Reyes and E. P. Scott, "One-Dimensional Heat Transfer Analysis in Open-Cell 10-ppi Metal Foam," *International Journal of Heat and Mass Transfer*, Vol. 48, No. 25-26, 2005, pp. 5112-5120.
51. N. **Dukhan**, K. C. Masiulaniec, K. J. De Witt and G. J. Van Fossen, "Experimental Frossling Numbers from Ice-Roughened NACA 0012 Airfoils," *AIAA Journal of Aircraft*, Vol. 40, No. 6, 2003, pp. 1161-1167.
52. N. **Dukhan**, K. C. Masiulaniec, K. J. De Witt and G. J. Van Fossen, "Experimental Heat Transfer Coefficients from Ice-Roughened Surfaces for Aircraft Deicing Design," *AIAA Journal of Aircraft*, Vol. 36, No. 6, 1999, pp. 948-956.
53. N. **Dukhan**, K. C. Masiulaniec, K. J. De Witt and G. J. Van Fossen, "Acceleration Effect on the Stanton Number for Castings of Ice-Roughened Surfaces," *AIAA Journal of Aircraft*, Vol. 35, No. 5, 1999, pp. 896-898.

Refereed Conference Proceedings

1. O. Saad and N. **Dukhan**, "Modeling of Metal Foam for Heat Transfer Using Equilateral Triangle Tube Bank," *Proceedings, 5th International Conference on Advances in Mechanical Engineering*, Istanbul, Turkey, 17-19 October 2021.
2. A. A. Hmad and N. **Dukhan**, "Analysis of Metal Foam Cooling of Fuel-Cell Stacks and Experimental Verification on an Internal Cell," *Proceedings, 5th International Conference on Advances in Mechanical Engineering*, Istanbul, Turkey, 17-19 October 2021.
3. N. **Dukhan**, Y. Awin and U. Dutta, "Superior PEM Fuel Cell with 72% and 63% Porous Metal Flow Fields at the Anode and Cathode," *Proceedings, The 13th International Conference on Thermal Engineering: Theory and Applications*, Baku, Azerbaijan, June 12-14, 2020.
4. N. **Dukhan** and O. Saad, "Cylinder-Pack Modeling of Open-Cell Metal Foam for Flow and Heat Transfer," *Proceedings, 11th International Conference on Porous Metals and Metallic Foams (MetFoam 2019)*, Dearborn, Michigan, USA, August 20–23, 2019.
5. A. Hmad and N. **Dukhan**, "Cooling of PEM Fuel Cell Stacks Using Open-Cell Metal Foam," *Proceedings, the International Conference on Porous Metals and Metallic Foams (MetFoam 2019)*, Dearborn, Michigan, USA, August 20–23, 2019.

6. **N. Dukhan** and Y. Awin, "Novel Metal-Foam Flow Fields for PEM Fuel Cells with Enhanced Performance," The 11th Annual Ground Vehicle Systems Engineering and Technology Symposium, Novi, MI, August 13 – 15, 2019
7. Y. Awin and **N. Dukhan**, "Novel Flow Field for Proton Exchange Membrane Fuel Cells made from 72%-Porous Aluminum-Foam," 3rd World Conference on Technology, Innovation and Entrepreneurship, Istanbul, Turkey, June 21-23, 2019
8. Y. Awin and **N. Dukhan**, "Metal-Foam Bipolar Plate for PEM Fuel Cells: Simulations and Preliminary Results," **Keynote Speech**, 10th International Conference on Porous Metals and Metallic Foam, Nanjing, China, September 14 to 17, 2017.
9. A. Arbak, M. Özdemir, **N. Dukhan** and Ö. Bağcı, "Numerical Modeling of Pressure Drop and Heat Transfer in Open-Cell Metal Foam," Proceedings, The Porous and Powder Materials Symposium and Exhibitions, Kusadasi, Turkey, September 12-15, 2017.
10. Ö. Bağcı, A. Arbak and **N. Dukhan** "High-Frequency Oscillating Water Flow in Highly-Porous Media: Experimental Results for 10-ppi Metal Foam," 12th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Costa del Sol, Malaga, Spain, July 11-13, 2016.
11. Ö. Bağcı, A. Arbak, M. De Paepe and **N. Dukhan**, "Experimental Results for Oscillatory Water Flow in 10-ppi Metal Foam at Low-Frequencies," 7th European Thermal-Sciences Conference, Krakow, Poland, June 19-23, 2016.
12. **N. Dukhan**, A. Arbak and Ö. Bağcı, "The Thermal Entry Region of Water Flow in Aluminum Foam with High Porosity and 40 Pores per Inch," **Keynote Speech**, International Conference on Advances in Mechanical Engineering, Istanbul, Turkey, May 10-13, 2016.
13. **N. Dukhan**, "Thermal Systems for Hybrid and Electric Vehicles," SAE 2016 World Congress & Exhibition, Detroit, MI, April 12-14, 2016.
14. **N. Dukhan**, Ö. Bağcı, A. Arbak, and Michel De Paepe "Heat Transfer Measurements for Non-Darcy Flow in 10-ppi Metal Foam," Proceeding, International HVAC+R & Sanitary Technology Symposium, Istanbul, Turkey, March 31 – April 2, 2016.
15. Ö. Bağcı, A. Arbak and **N. Dukhan**, "Thermal Development for Darcy Water Flow in 10-ppi Metal Foam: Experimental Results," International Conference on Energy Systems, Istanbul, Turkey, December 23-25, 2015.
16. A. Arbak, Ö. Bağcı and **N. Dukhan**, "Flow Regimes in Commercial Metal Foam Having 10 Pores Per Inch," International Conference on Energy Systems, Istanbul, Turkey, December 23-25, 2015.
17. Ö. Bağcı, A. Arbak and **N. Dukhan**, "Experimental Results for Low-Frequency Oscillating Water Flow in Foam-Like Highly-Porous Media," Third Energy Technologies Conference, Istanbul, Turkey, December 21-23, 2015.
18. A. Arbak, Ö. Bağcı and **N. Dukhan**, "Experimental Determination of Flow Regimes In Open-Cell 40-ppi Aluminum Foam," Third Energy Technologies Conference, Istanbul, Turkey, December 21-23, 2015,
19. Ö. Bağcı, **N. Dukhan** and M. Özdemir "Heat Transfer Due to Turbulent Flow Water in Metal Foam: Limited Experimental Results and Difficulties," 8th International Symposium on Turbulence, Heat and Mass Transfer, Sarajevo, Bosnia, Sep 15-18, 2015.
20. Ö. Bağcı, **N. Dukhan**, M. Özdemir and L. A. Kavurmacioğlu, "Experimental Heat Transfer Due to High-Frequency Oscillating Water Flow in 20-PPI Aluminum Foam," International Porous and Powder Materials Symposium and Exhibition, Izmir, Turkey, September 15-18, 2015
21. Ö. Bağcı, **N. Dukhan** and L. A. Kavurmacioğlu, "Heat Transfer Due to Oscillating Flow of Water in Metal Foam: An Experiment at Low Frequency," 9th International Conference on Porous Metals and Metallic Foams, Barcelona, Spain, Aug 31-Sep 2, 2015.

22. N. **Dukhan**, Ö. Bağcı and L. A. Kavurmacioğlu, "Thermal Development of Non-Darcy Water Flow in Open-Cell Metal Foam: Experimental Results," 9th International Conference on Porous Metals and Metallic Foams, Barcelona, Spain, Aug 31-Sep 2, 2015. (**Invited Speaker**).
23. N. **Dukhan** and A. S. Suleiman, "Simulation of Heat Transfer in the Entry Region of Metal Foam," 8th International Conference on Computational Heat and Mass Transfer, Istanbul, Turkey, May 25-28, 2015
24. Ö. Bağcı, N. **Dukhan**, M. Özdemir and L. A. Kavurmacioğlu, "Numerical Solution of Flow in Open-Cell Metal Foam and Comparison to Experiment," 8th International Conference on Computational Heat and Mass Transfer, Istanbul, Turkey, May 25-28, 2015
25. N. **Dukhan**, Ö. Bağcı, and M. Özdemir, "Experimental Thermal Development in Open-Cell Metal Foam: Darcy Flow of Water," 7th International Conference on Porous Media & Annual Meeting, Padova, Italy, May 18 - 21, 2015.
26. N. **Dukhan**, Ö. Bağcı, M. Özdemir and L. A. Kavurmacioğlu, "Experimental Fully-Developed Thermal Convection for Non-Darcy Water Flow in Metal Foam," International Conference on Advances in Mechanical Engineering, Istanbul, Turkey, May 13-15, 2015.
27. Ö. Bağcı, N. **Dukhan**, M. Özdemir, "Experimental Convection Heat Transfer Due to Water Flow in Metal Foam," International Conference on Energy Technologies, Istanbul, Turkey, December 22-24, 2014.
28. Ö. Bağcı, N. **Dukhan**, M. Özdemir, "Flow Regimes in Foam-Like Highly Porous Media," 10th International Conference of Heat Transfer, Fluid Mechanics and Thermodynamics, Orlando, FL, July 14-16, 2014. (Outstanding paper award)
29. Ö. Bağcı, N. **Dukhan**, M. Özdemir, "Various Flow Regimes and Permeabilities for Packed-Spheres Porous Media," 10th International Conference on Diffusion in Solids and Liquids, Paris, France, June 23 - 27, 2014.
30. A. S. Suleiman and N. **Dukhan**, "Simulation of Convection Heat Transport in Open-Cell Metal Foam," Proceedings, International Conference on Thermophysical and Mechanical Properties of Advanced Materials, Izmir, Turkey, June 12-15, 2014.
31. Ö. Bağcı, N. **Dukhan** and M. Özdemir, "Characterization of Oscillating Water Transport in Metal Foam," Proceedings, International Conference on Thermophysical and Mechanical Properties of Advanced Materials, Izmir, Turkey, June 12-15, 2014.
32. Ö. Bağcı, N. **Dukhan**, M. Özdemir, "Liquid Flow in Packed Spheres of Equal Diameters: Regimes, Permeability and Forchheimer Coefficient," Proceedings, Convective Heat and Mass Transfer Conference, Kusadasi, Turkey, June 8-13, 2014.
33. N. **Dukhan**, M. Musa and M. Ali, "The Influence of Spacing of Segmented Metal Foam on Airflow Pressure Drop," Proceedings, International Porous Media Conference, Cluj-Napoca, Romania, August 25 – 28, 2013.
34. N. **Dukhan**, M. A. Al-Rammahi and A. S. Suleiman "Simulation and Validation of Metal-Foam Cooling Design," Proceedings, Ground Vehicle Systems Engineering and Technology Symposium, Troy, MI, August 20-22, 2013.
35. A. S. Suleiman and N. **Dukhan**, "Basic Cell Geometry for Modeling Flow in Metal Foam," Proceedings, ASME Power Conference, Boston, MA, July 29 - August 1, 2013.
36. A. S. Suleiman and N. **Dukhan**, "Numerical Convection Heat Transfer in Metal Foam Using Unit Cell Geometry," Proceedings, ASME Summer Heat Transfer Conference, Minneapolis, MN, July 14 - 19, 2013.
37. N. **Dukhan**, M. A. Al-Rammahi and A. S. Suleiman, "Thermal Convection Measurements inside Aluminum Foam and Comparison to Existing Analytical Solutions," Proceedings, 8th International Conference on Porous Metals and Metallic Foams, Raleigh, NC, June 23-26, 2013. (**Invited Speaker**)

38. Z. Yuan, N. Rayess and N. **Dukhan**, "Modeling of the Mechanical and Dynamic Properties of a Polymer-Metal Foam Hybrid," Proceedings, 8th International Conference on Porous Metals and Metallic Foams, Raleigh, NC, June 23-26, 2013.
39. A. Suleiman and N. **Dukhan**, "A Cell Geometrical Model to Numerically Study Fluid Flow in Metal Foam," Presented, SAE 2013 World Congress & Exhibition, Detroit, MI, April 16-18, 2013.
40. N. **Dukhan**, "Brinkman-Extended Darcy Flow in Metal Foam: Analysis and Experiment," Proceedings, 9th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Malta, July 16 - 18, 2012.
41. N. **Dukhan** and M. A. Al-Rammahi, "Analysis and Experiment for Darcy Flow Convection in Cylindrical Metal Foam," Proceedings, 4th International Conference on Porous Media and its Applications in Science, Engineering and Industry, Potsdam, Germany, June 17-22, 2012.
42. N. **Dukhan**, "Analytical Convection for Darcy Gas Flow in Cylindrical Porous Media Subjected to Constant Wall Temperature," Proceedings, 6th International Conference on Thermal Engineering: Theory and Applications, Istanbul, Turkey, May 29 – June 1, 2012.
43. M. A. Zamora, N. Rayess and N. **Dukhan**, "Integrated Aluminum Foam Polymer Sandwich Construction and Failure," Society for the Advancement of Material and Process Engineering Conference, Baltimore, Maryland, May 21-24, 2012.
44. N. **Dukhan** and C.-L. Chen, "Metal-Foam Enhanced PCM Storage System: The Cylinder-in-Cylinder Geometry," Proceedings, ASHRAE Winter Meeting, Chicago, IL, Jan. 21-25, 2012.
45. N. **Dukhan**, "Approximate Analysis for Darcy-Flow Convection in Cylindrical Porous Media with Zero Fluid Conduction," Proceedings, ASME International Mechanical Engineering Congress & Exposition, Denver, CO, November 11-17, 2011.
46. K. Patel, N. Rayess, N. **Dukhan**, S. Sharma and D. Houston, "Elevated Temperature Creep Behavior of an Aluminum Foam Polymer Hybrid Material," Proceedings, Society for the Advancement of Material and Process Engineering Conference, Dallas, TX, October 2011.
47. M. Zamora, N. Rayess and N. **Dukhan**, "Integrated Aluminum Foam Polymer Sandwich Construction," Proceedings Society for the Advancement of Material and Process Engineering Conference, Dallas, TX, October, 2011.
48. N. **Dukhan**, "Analysis of Darcy Flow in Confined Porous Media Including Wall Effect," Proceedings, ASME Small Modular Reactors Symposium, Washington, DC, September 28 – 30, 2011.
49. N. **Dukhan** and M. Ali, "Transition among Flow Regimes in 10-ppi Open-Cell Aluminum Foam," Proceeding, 7th International Conference on Metal Foam, Busan, S. Korea. Sept. 18-21, 2011. **(Invited Speaker)**
50. M. Zamora, N. Rayess, N. **Dukhan**, "Construction of an Integrated Aluminum Foam Polymer Sandwich Material," Proceedings, 7th International Conference on Metal Foam, Busan, S. Korea, Sept. 18-21, 2011.
51. N. **Dukhan**, "Metal-Foam Enhanced PCM Storage System: The Cylindrical Shell Geometry," Proceedings, ASME 5th International Conference on Energy Sustainability Conference, Washington, DC, Aug 7-10, 2011.
52. N. **Dukhan** and M. B. Ali, "Effect of Sample's Diameter on Flow Properties of Open-Cell Metal Foam," Proceedings, ASME International Mechanical Engineering Congress & Exposition, Vancouver, British Columbia, Canada, November 12-18, 2010.
53. N. **Dukhan**, X. Li and N. Rayess, "Measurement of the Thermal Conductivity of Aluminum Foam-Polypropylene Interpenetrating Phase Composites," Proceedings, Cellular Materials Conference, Dresden, Germany, October 27-29, 2010.

54. N. Rayess, N. **Dukhan** and A. Adenwala, "Modeling of Tensile Properties of a Polymer-Metal Foam Structural Hybrid Material," Proceedings, Cellular Materials Conference, Dresden, Germany, October 27-29, 2010.
55. N. **Dukhan** and J. Ratowski, "Convection Heat Transfer Analysis for Darcian Flow in Porous Media: A New Two-Dimensional Solution," Proceedings, 14th International Heat Transfer Conference, Washington, DC, August 8-13, 2010.
56. N. **Dukhan** and C. A. Minjeur II, "A New Approach for Determining the Permeability of Cellular Metals," Proceedings, 7th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Antalya, Turkey, July 19 – 21, 2010.
57. N. **Dukhan** and C. A. Minjeur II, "Minimum Thickness for Open-Cell Metal Foam to Behave as a Porous Medium," Proceedings, AIAA 40th Fluid Dynamics Conference and Exhibit, Chicago, IL, June 28 - July 2, 2010.
58. N. **Dukhan** and K. Patel, "Entrance Effects for Fluid Flow in Cellular Metals," Proceedings, 3rd International Conference on Porous Media and Its Applications in Science, Engineering and Industry, Montecatini, Italy, June 20-24, 2010.
59. N. **Dukhan** and J. Ratowski, "Velocity Profile for Darcian Flow in Porous Media: A New Two-Dimensional Solution," Proceedings, 3rd International Conference on Porous Media and its Applications in Science, Engineering and Industry, Montecatini, Italy, June 20-24, 2010.
60. N. **Dukhan** and S. Bodke, "An Improved PCM Heat Storage Technology Utilizing Metal Foam," Proceedings, iTherm 2010, Las Vegas, NV, June 2-5, 2010.
61. J. Hadley, N. Rayess and N. **Dukhan**, "Mechanical Properties of Aluminum Foam-Polymer Multifunctional Hybrid Materials," Proceeding, ASME International Mechanical Engineering Congress & Exposition, Lake Buena Vista, FL, November 13-19, 2009.
62. S. Sharma, N. Rayess and N. **Dukhan**, "Preliminary NVH Characterization of Metal Foam-Polymer Interpenetrating Phase Composites," Proceedings, ASME International Mechanical Engineering Congress & Exposition, Lake Buena Vista, FL, November 13-19, 2009.
63. J. Hadley, N. Rayess, N. **Dukhan** and D. Houston "Tensile Strength of Aluminum Foam-Polypropylene Interpenetrating Phase Composites," Proceedings, Society for the Advancement of Material and Process Engineering Conference, Wichita, KS. October 19-22, 2009.
64. N. **Dukhan**, N. Rayess, W. Feng-Gang and J. Hadley, "Thickness Effect on Flexural Modulus of Aluminum Foam-Polypropylene Interpenetrating Phase Composite," Proceedings, 6th International Conference on Porous Metals and Metallic Foams, Bratislava, Slovakia, September 1-4, 2009.
65. N. **Dukhan**, "Approximate Analysis for Darcy-Flow Convection in Porous Media with Zero Fluid Conduction," Proceedings, InterPACK'09, San Francisco, CA, July 19-24, 2009.
66. N. **Dukhan**, N. Rayess and J. Hadley, "Preliminary Flexural Testing Results of Aluminum Foam-Polypropylene Interpenetrating Phase Composites," Proceedings, Fall Technical Conference of the Society for the Advancement of Material and Process Engineering, Memphis, TN, September 8–11, 2008.
67. N. **Dukhan**, "Forced Convection in Porous Media without Fluid Conduction in the Developing Region," Proceedings, 9th International Symposium on Transport Phenomena, Reykjavik, Iceland, August 7-21, 2008.
68. N. **Dukhan**, K. Dzwigalski and T. Rourke, "Average Geometrical Parameters for the Internal Structure of Aluminum Foam," Proceedings, 5th International Conference on Porous Metals and Metallic Foams, Montreal, Canada, Sept. 5-7, 2007.
69. N. **Dukhan** and P. Patel, "Effect of Porosity on Permeability and Form Drag of Porous Metals," Proceedings, 5th International Conference on Porous Metals and Metallic Foams, Montreal, Canada, Sept. 5-7, 2007.

70. N. **Dukhan** and P. Patel, "Equivalent Particle Diameter for Porous Metals," Proceedings, Second International Conference on Porous Media and its Applications in Science, Engineering and Industry, Kauai, Hawaii, June 17-21, 2007.
71. N. **Dukhan** and R. Picón-Feliciano, "Heat Transfer Analysis in Metal Foam with Low-Conductivity Fluid," Proceedings, ASME Mechanical Engineering Congress and Exposition, Orlando, FL, Nov. 5-11, 2005.
72. N. **Dukhan**, N. M. Martinez-Toro, J. O. Class-Quiñones, E. P. Scott, M. Mital and Y. F. Pang, "Assessment of Metal Foam Cooling of High-Power Electronics," Proceedings, 27th International Telecommunications Energy Conference, Washington, DC, September 2005.
73. N. **Dukhan**, Á. Álvarez-Hernández, E. Cruz and R. Picón-Feliciano, "Approximate Conduction/Convection Analysis in Metal Foam," Proceedings, ASME Summer Heat Transfer Conference, San Francisco, CA, July 17-22, 2005.
74. N. **Dukhan**, N.M. Martinez-Toro, J. O. Class-Quiñones, Y. F. Pang, E. P. Scott and M. Mital, "Direct Comparison between a Heat Sink and a Foam Block Cooling of a Computer Chip," Proceedings, Annual Conference of the Center for Power Electronics and Systems, Blacksburg, VA, April 17-19, 2005.
75. N. **Dukhan** and Á. Álvarez-Hernández, "Pressure Drop Measurements for Air Flow through Open-Cell Aluminum Foam," Proceedings, ASME International Engineering Congress, Anaheim, CA, November 13-19, 2004.
76. N. **Dukhan**, J. M. González-Negrón and R. Picón-Feliciano, "An Approach for Simulating Metal Foam Cooling of High-Power Electronics," Proceedings, International Telecommunications Energy Conference, Chicago, IL, September 19 - 23, 2004.
77. N. **Dukhan**, P. D. Quiñones, C. Briano and J. Fontánez, "One-Dimensional Model for the Combined Heat Transfer in Open-Cell Metal Foam," Proceedings, ASME-ZSIS International Thermal Science Seminar, Bled, Slovenia, June 13 -16, 2004.
78. N. **Dukhan**, C. Briano and J. Fontánez, "Characterization of the Heat Transfer in Open-Cell Metal Foam," Proceedings, Second International Conference on High Performance Structures and Materials, HPSM, Ancona, Italy, May 31 - June 2, 2004.
79. N. **Dukhan** and Á. Álvarez-Hernández, "Experimental Assessment of Air Pressure Drop through 40-PPI Aluminum Foam," Proceedings, Congreso de Ingeniería y Agrimensura, Colegio de Ingenieros y Agrimensores de Puerto Rico, San Juan, Puerto Rico, April 23, 2004.
80. N. **Dukhan** and E. Cruz. "Two-Dimensional Modeling of Heat Transfer in Open-Cell Metal Foam," Proceedings, Congreso de Ingeniería y Agrimensura, Colegio de Ingenieros y Agrimensores de Puerto Rico, San Juan, Puerto Rico, April 23, 2004.
81. C. Briano, J. Fontánez and N. **Dukhan**, "Effect of Flow Rate on the Heat Transfer in 10-PPI Aluminum Foam," 24th Puerto Rico Interdisciplinary Scientific Meeting, Humacao, Puerto Rico, March 13, 2004.
82. C. Briano, J. Fontánez and N. **Dukhan**, "One Dimensional Heat Transfer Model for Open-Cell Metal Foam," 14th Undergraduate Research Symposium, Metropolitan University, San Juan, Puerto Rico, October 24 – 26, 2003. (first place award)
83. N. **Dukhan** and P. D. Quiñones, "Analysis of Porous Media Cooling Techniques," Proceedings, Congreso de Ingeniería y Agrimensura, Colegio de Ingenieros y Agrimensores de Puerto Rico, Politecnica University, San Juan, Puerto Rico, April 15, 2003.
84. N. **Dukhan** and P. D. Quiñones, "Simulations of Metal Foam Cooling of High-Power Electronics Using the Equivalent Thermal Conductivity," Proceedings, ASME International Mechanical Engineering Congress, Washington, DC, November 16 - 21, 2003.

85. N. **Dukhan** and P. D. Quiñones, "An Equivalent Thermal Conductivity for Open Cell Metal Foam for Solar Air Heaters," Proceedings, International Solar Energy Conference, Hawaii, March 16-18, 2003
86. N. **Dukhan**, K. C. Masiulaniec, K. J. De Witt and G. J. Van Fossen, "Experimental Heat Transfer Coefficients from Ice-Roughened NACA 0012 Airfoil," Proceedings, 9th Latin American Congress on Heat and Mass Transfer, San Juan, Puerto Rico, October 20, 2002.
87. J. E. Gonzalez, L. H. Alva and N. **Dukhan**, "Solar Air Conditioning Systems with PCM Solar Collectors," Proceedings, International Solar Energy Conference, Reno, NV, June 15-20, 2002.
88. N. **Dukhan**, K. C. Masiulaniec, K. J. De Witt and G. J. Van Fossen, "Convective Heat Transfer Coefficients from Various Types of Ice- Roughened Surfaces in Parallel and Accelerated Flows," Proceedings, AIAA 34th Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 15-18, 1996.
89. N. **Dukhan**, K. C. Masiulaniec and A. Afjeh, "Flow Characteristics of Multiple Rows of Jets Expanding in a Square Duct at Low Reynolds Numbers," Proceedings, 24th Midwestern Mechanics Conference, Iowa State University, Ames, Iowa, October 1995.
90. N. **Dukhan**, K. C. Masiulaniec, K. J. De Witt and G. J. Van Fossen, "Convective Heat Transfer from Castings of Ice-Roughened Surfaces in Horizontal Flight," Proceedings, International Icing Symposium of the American Helicopter Society, Montreal, Canada, September 1995.
91. N. **Dukhan**, K. C. Masiulaniec, K. J. De Witt and G. J. Van Fossen, "Experimental Technique and Assessment for Measuring the Convective Heat Transfer Coefficient from Natural Ice Accretions," Proceedings, AIAA 33rd Aerospace Sciences Meeting, Reno, NV, January 1995.

Engineering Education

92. N. **Dukhan**, "Procurement of Transient Heat Transfer Lab Experiment at No Budget, 127th ASEE Annual Conference & Exposition, Virtual, June 22 to 26, 2020.
93. N. **Dukhan**, "Framing Students' Learning Problems of Thermodynamics," 123rd ASEE Annual Conference & Exposition, New Orleans, LA, June 26 - 29, 2016.
94. N. **Dukhan**, "Awareness of Non-Technical Skills of Future Engineers: An Assessment," Proceedings, Engineering Leaders for Grand Challenges, Doha, Qatar, Nov. 9 - 11, 2014.
95. N. **Dukhan**, "On the Worldwide Engineering Students' Meager Performance in Thermodynamics," Proceedings, Engineering Leaders for Grand Challenges, Doha, Qatar, Nov. 9 - 11, 2014.
96. N. **Dukhan** and N. Rayess, "Introductory Curriculum Content Targeting Innovation and Entrepreneurship for Engineering Students," Proceedings, ASEE Annual Conference and Exposition, Atlanta, GA, June 23-26, 2013.
97. N. **Dukhan** and M. Schumack, "Understanding the Continued Poor Performance in Thermodynamics as a First Step toward an Instructional Strategy," Proceedings, ASEE Annual Conference and Exposition, Atlanta, GA, June 23-26, 2013.
98. N. **Dukhan** and N. Rayess, "On Teaching Non-Technical Skills for the Engineers of 2020," Proceedings, World Congress on Engineering Education, Doha, Qatar, January 7-9, 2013.
99. N. **Dukhan** and M. Schumack, "Thermal Science Capstone Projects in Mechanical Engineering," Proceedings, ASEE Annual Conference & Exposition, Vancouver, BC, Canada, June 26-29, 2011.
100. N. **Dukhan** and M. Schumack, "A Service-Learning Experience in Engineering and Its Impact on Students," Proceedings, ASEE Annual Conference & Exposition, Austin, TX, June 14-17, 2009.

101. N. **Dukhan**, "Undergraduate Research as a Motivation for Attending Graduate School," Proceedings, ASEE Annual Conference, Honolulu, Hawaii, June 24-27, 2007.
102. N. **Dukhan**, "Student/Teacher Role Swap in Heat Transfer," Proceedings, ASEE Annual Conference, Honolulu, Hawaii, June 24-27, 2007.
103. N. **Dukhan**, "A Project for Awareness of Environmental Issues for Non-Traditional Mechanical Engineering Students," Proceedings, 36th Annual Frontiers in Education Conference, San Diego, CA, October 28-31, 2006.
104. N. **Dukhan**, M. Schumack, J. Daniels and M. Jenkins, "Implementation and Impact of a Service-Learning Project in Mechanical Engineering," National Conference on Service Learning in Engineering, Washington, DC, May 24, 25, 2006.
105. N. **Dukhan**, "Undergraduate Research Impact on Soft Skills," Proceedings, 7th World Congress on Engineering Education, Budapest, Hungary, March 4-8, 2006.
106. N. **Dukhan**, "Impact of Undergraduate Research on Students' Communication Skills," Proceedings, IGIP 34th International Symposium / Design of Education in the 3rd Millennium, Istanbul, Turkey, September 12-16, 2005.
107. N. **Dukhan**, "Communication in Undergraduate Research," Proceedings, 6th Int. Conference on Information Technology Based Higher Education and Training, Santo Domingo, Dominican Republic, July 7-9, 2005.
108. S. Kiefer and N. **Dukhan**, "The Benefits of Undergraduate Research and Independent Study Courses," Proceedings, ASEE Annual Conference, Portland, OR, June 12-15, 2005.
109. N. **Dukhan** and S. Kiefer. "Building a Research Program with Undergraduate Students," Proceedings, IGIP Engineering Education International Symposium, Fribourg, Switzerland, September 27-October 1, 2004.

Refereed Conference Presentations

1. **N. Dukhan**, "Enhanced PEM Fuel Cell with 72% and 63% Porous Metal Flow Fields at the Anode and Cathode," TechConnect World Innovation Conference & Expo, Washington, DC, USA, October 18-21, 2021
2. **N. Dukhan**, "Solid-Cylinder-Bundles Modeling of Open-Cell Metal Foam," 5th International Conference on Advances in Mechanical Engineering, Istanbul, Turkey, Dec. 17 – 19, 2019.
3. Y. Awin and **N. Dukhan**, "Characterization and of Metal-Foam Flow Field for PEM Fuel Cells," 11th International Conference on Porous Metals and Metallic Foams (MetFoam 2019), Dearborn, Michigan, USA, August 20–23, 2019.
4. L.-P. Lefebvre, **N. Dukhan**, B. Guerreiro, E. Irissou, C. Cojocar, A. Hmad, O. Saad, "Structure and Permeability of Porous Structures Deposited by Shock Wave Induced Spraying," 11th International Conference on Porous Metals and Metallic Foams (MetFoam 2019), Dearborn, Michigan, USA, August 20–23, 2019.
5. **N. Dukhan** and Y. Awin, "Metal Foam as Flow Field for Fuel Cells: Simulation and Experiment," **Keynote Speech**, International Conference on Advances in Mechanical Engineering, Istanbul, Turkey, December 19-21, 2018.
6. **N. Dukhan**, "On the Use of Metal Foam as Flow Field in Fuel Cells," **Keynote Speech**, International Conference on Advances in Mechanical Engineering, Istanbul, Turkey, December 19-21, 2017.
7. Y. Awin and **N. Dukhan**, "Performance Characterization of Meso-Porous Metal-Foam Flow Fields for Fuel Cells," 8th International Advances in Applied Physics and Materials Science Congress & Exhibition" Oludeniz, Turkey, April 24-30, 2018.

Non-Refereed Conference Presentations

1. O. Saad and **N. Dukhan**, "Pin-Fin Modeling of Open-Cell Metal Foam," 8th Annual E&S Research Symposium, University of Detroit Mercy, 3rd Place Award, November 20, 2020
2. Y. Awin and **N. Dukhan**, "Novel Bipolar Plate with Metal-Foam Flow Field for PEM Fuel Cells: Basic Design and Performance," Eaton Technology Open House and Poster Session - Eaton Innovation Center, Southfield, MI, Nov. 2, 2018
3. A. Suleiman and **N. Dukhan**, "Geometrical Modeling and Simulation of Flow in Metal Foam," Presented, 4th Annual Midwest Graduate Research Symposium, University of Toledo, Toledo, OH, April 20, 2013
4. A. Suleiman and **N. Dukhan**, "Numerical and Experimental Fluid Flow in Metal Foam," University of Detroit Mercy Celebration of Scholarly Achievement, April 16, 2013.
5. A. Suleiman and **N. Dukhan**, "Simulation of Heat Transfer in Aluminum Foam," University of Detroit Mercy Celebration of Scholarly Achievement, April 16, 2013
6. J. Goryca and **N. Dukhan**, "Thermal Analysis of Japan's Endangered Nuclear Reactors," University of Detroit Mercy Celebration of Scholarly Achievement, April 19, 2011
7. **N. Dukhan**, M. Schumack, and J. Daniels, "A Service Learning Case Study in Heat Transfer," University of Detroit Mercy Faculty and Student Research Symposium and Poster Fair, April 17, 2008
8. **N. Dukhan** and P. Patel, "Pressure Drop and Permeability of Metal Foam," University of Detroit Mercy Faculty and Student Research Symposium and Poster Fair, April 17, 2007.
9. **N. Dukhan**, K. Dzwigalski and T. Rourke, "Geometrical Description of the Internal Architecture of Aluminum Foam," University of Detroit Mercy Faculty and Student Research Symposium and Poster Fair, April 17, 2007.

Under Review

- A. Arbak, M. Ozdemir and **N. Dukhan**, "Heat transfer of pulsating water flow through aluminum-foam channel under asymmetric constant heat flux boundary condition," Submitted, International Journal of Thermal Sciences, Jan. 15, 2022.
- A. A. Hmad and **N. Dukhan**, A Cooling Design for an End Cell in Fuel-Cell Stack Using Forced Air Flow in Metal Foam: Modelling and Experiment, Submitted, World Symposium on Mechanical - Materials Engineering & Science, Prague (Czech Republic), Sept. 9-11, 2021
- **N. Dukhan** and Y. Awin, "Development and Testing of New Bipolar Plate for PEM Fuel Cells Using Solid and 85.1% Porous Aluminum, Submitted, 15th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics (HEFAT2020), Amsterdam, 20 – 23 July 2021.
- A. Arbak and **N. Dukhan**, "Numerical Modeling of Heat Transfer in Highly Porous Conductive Media- Metal Foam as an Example," XII International Conference on Computational Heat, Mass and Momentum Transfer, Rome, Italy, 3-6 September 2021.

Planned Papers

- **N. Dukhan**, "Estimation of Fluid Bulk Temperature for Convection inside Porous Media from Non-Intrusive External Measurements," International **Journal** of Thermal Science.

- **N. Dukhan**, “Nanofluids Flow and Heat Transfer in Porous Media- a Critical Review,” Invited, International **Journal** of Heat and Mass Transfer.
- **N. Dukhan**, “Issues in Learning Engineering Thermodynamics- a Review,” International **Journal** of Mechanical Engineering Education.

Intellectual Property

- **“Cooling and Heating System for an Equipment Enclosure Using a Vortex Tube,” US Patent 6,401,463 B1. Granted, June 11, 2002.**
- “Enclosure Storage for Compressed Gas Systems,” Marconi’s Invention Disclosure Form with Michael Cosley, December 13, 2000.
- “Closed-Loop Vortex Tube Cooling System,” Marconi’s Invention Disclosure Form, October 19, 2000.
- “An Advanced Vapor Compression Cycle for Cooling Electronics,” Marconi’s Invention Disclosure Form, May 12, 2000.

Funded Grants/Proposals

1. “Metal-foam cooling system for high-performance computer clusters for next generation electric architecture,” Ford Motor Company, November 2021, (2 years), \$173,362
2. Extension: “Bringing Nano Technology to UDM via Investigating Nanofluids Heat Transfer,” Faculty Research Award, UDM, March 2020 (1 year), \$5,415.
3. “Bringing Nano Technology to UDM via Investigating Nanofluids Heat Transfer,” Faculty Research Award, UDM, March 2018 (1 year), \$12,573.
4. “Thin-Tube-Bundle Representation of the Boundary Region of Metal Foam,” Faculty Research Award, UDM, Feb. 2017 (1 year), \$4000.
5. “Thermal Characterization of Cold Plates with Corevo Foam,” Constellium, June 2016 (1 month), \$29,000.
6. “Light-Weight Thermal Management for Fuel Cells Using Metal Foam,” Faculty Research Award, UDM, Feb. 2016 (1 year), \$15,410.
7. “Metal Foam Heat Transfer Investigation,” Faculty Research Awards, UDM, May 2012 (1 year), \$8,777.
8. “Novel Thermal Storage Technology for Vehicles Waste Heat,” Faculty Grant Incentive Program, College of Engineering and Science, UDM, Feb. 2010 (1 year), \$5,000.
9. “Thermal Phase-Change Storage and LADAR Localization and Navigation Systems,” DENSO North America, May 2009 (1 year), \$50,000.
10. “Thermal Imaging System,” Chrysler Foundation, September 2008, \$10,000.
11. “Investigation of Metal Foam Polymer Composites for Automotive Applications,” University Research Program, Ford Motor Company, January 2008 (3 years), \$120,000.
12. “Tensile Testing of Aluminum Foam Polymer Composites,” Ford Motor Company, January 2008 (3 months), \$10,000.
13. “Two Students Conference Travel to MetFoam 2007, Montreal, Canada,” NSF, September 2007, \$600.
14. “Material Characterization of Aluminum Foam Polymer Composites: Preliminary Characterization of Flexural Properties,” Ford Motor Company, September 2007 (3 months), \$10,000.
15. “Heat Transfer Analysis in Porous Metal for Electronic Cooling Using Thermal Imaging,” Faculty Grant Incentive Program, College of Engineering and Science, UDM, January 2006, (1 year) \$8,955.

16. "Advanced Cooling Technologies Research Lab," Faculty Grant Incentive Program, College of Engineering and Science, UDM, August 2005 (1 year), \$10,000.
17. "Metal Foam Cooling of IPEM Chip," NSF-Center for Power Electronics and Systems, Virginia Tech, September 2005 (1 year), \$15,000.
18. "Metal Foam Cooling of Electronics," NSF-Center for Power Electronics and Systems, Virginia Tech, September 2004 (1 year), \$15,000.
19. "Heat Transfer Analysis of Open-Cell Metal Foam," Pratt and Whitney, January 2004 (1 year), \$39,760.
20. "An Investigation of the Heat Transfer and Pressure Drop of Conducting Foam," Seed Money Grant, Research and Development Center, University of Puerto Rico, January 2002 (1 year), \$10,000.
21. "Two-Dimensional Numerical Modeling of Heat Transfer in Metal Foam," NASA-PR Space Grant Consortium Scholarship/Fellowship Program, Aug. 2003 (1 year), \$12,000.
22. "ANSYS Modeling of Heat Transfer in Foam Using One-Dimensional Analytical Model," NSF-Excellence Award for Minority Students, June 2003 (1 year), \$6,000.
23. "Heat Transfer Characteristics of Open-Cell Metal Foam," NSF- Center for Power Electronics and Systems, Virginia Tech, August 2002 (1 year), \$13,590.
24. "Experimental Verification of One-Dimensional Heat Transfer in Metal Foam," NSF-Louis Stokes Alliance for Minority Participation Program, May 2002 (1 year), \$6,000.

Pending Proposals (as PI)

- "ERI: Pioneer Theoretical, Numerical and Experimental Investigations of a Thermal Management Technology Produced by Hybrid Nanofluids Convection in Metal Foam," Engineering Research Initiation program, The National Science Foundation, June 2021, (2 years), \$197,374

Proposals Submitted (recent only)

- "A New Modeling Paradigm for Investigating Transport in Solid Foam: Theoretical Foundation and Experimental Validation," The National Science Foundation, December 2020 (3 years), \$363,441
- "MRI: Acquisition of State-of-the-Art Integrated Fuel Cells Test System," The National Science Foundation, February 2018 (3 years), \$93,165
- "Minimal Modelling Technique for the Boundary Region of Hyper-Porous Media," The National Science Foundation, October 2017 (3 years), \$326,95
- "Thermal Development in Metal Foam as Harnessed for Strategic Cooling of Miniature Devices," The National Science Foundation, October 2016 (3 years), \$299,986
- "The Development Phenomena in Open-Cell Metal Foam Revealed: Provisions for Insight and Design," The National Science Foundation, October 2015 (3 years), \$283,973

Planned Proposals

1. "Acquisition of Industrial Test Equipment for PEM Fuel Cells," The National Science Foundation, MRI Program, \$98K.
2. "Metal-Foam Bipolar Plate for Proton Exchange Membrane Fuel Cell," Department of Energy, Office of Science, Basic Energy Science, 3 years, \$300K.
3. "Multifunctional Material for Armored Vehicles," Department of Defense, DARPA Tactical Technology Office: Next Generation Ground Vehicles, 3 years, \$450K.
Collaboration with material science and machine design faculty members

4. "Light-Weight Metal Foam Structural Components," Ford or Honda, 3 years, \$250K, Collaboration with material science and machine design faculty members
5. "Metal Foam Thermal Management Designs for Electronic Systems and Enclosures," Electronics and Telecom Industry, 2.5 years, \$300K.
6. "Enhancement of Phase Change Materials Energy Storage Using Metal Foam," Department of Energy, Office of Science, Basic Energy Science, 3 years, \$250K.
7. "A Recovery Unit for Capturing Waste Heat in Hybrid Electric Vehicles," Auto Industry, 2 years, \$250K.
8. "An Instructional Strategy for Enabling Rich Learning of Thermodynamics," The Spencer Foundation, 3 years, \$350K.

Industrial Research and Development Experience

1998 to 2001

*Advanced Thermal Systems,
Marconi Communications*

- Designed, selected, and integrated innovative heat management components and systems for the telecommunication industry: advanced vapor compression cycles, compressed-gas cooling systems, vortex tube coolers, mesoscale chip coolers, compact heat exchangers, thermal electric coolers, heat pipes, phase change materials, dehumidification techniques.
- Constructed and characterized experimental models and prototypes in the area of thermal sciences and systems; interpreted and reported results employing analytical and numerical skills.
- Obtained US patent following intellectual property and patent law and procedure, interacted with patent lawyers.
- Applied communications skills using oral and written reports of appropriate conciseness for different management levels.

Student Research Projects

1993 to 1996

*NASA Lewis Research Center,
Cleveland, OH*

- Designed, fabricated and tested forced convection heat transfer models. Correlated data and provided technical reports. Applied in-depth knowledge of thermal sciences.
- Experimentally investigated the convection heat transfer process from castings of ice shapes accumulated in actual-flight and wind-tunnel- simulated icing conditions. Results were implemented in new designs of de-icing of aircraft and in firing strategies of thermal de-icers.
- Modified the traditional investment casting process and applied it at subfreezing environment.

Awards and Honors

- **2021 Fulbright Specialist Award (6 weeks at Istanbul Medeniyet University,,Turkey)**
- **2018 Fulbright Specialist Award (6 weeks at Yildiz Technical University; Turkey)**
- **2016-2017 University Distinguished Professor Nominee of College of Engineering and Science, University of Detroit Mercy**
- **2014-2015 Fulbright Scholar Award, USA Department of State, to Istanbul Technical University, Istanbul, Turkey**
- **2014 ASME Fellow Grade, American Society of Mechanical Engineers**

- **2011 Faculty Achievement Award (Best assistant or associate professor university-wide; based on teaching and research). University of Detroit Mercy**
- 2011 Engineering Professor of the Year (nominated)
- Outstanding Paper Award: 10th International Conference of Heat Transfer, Fluid Mechanics and Thermodynamics, Orlando, FL, July 14-16, 2014. Ö. Bağcı, N. Dukhan, M. Özdemir, "Flow Regimes in Foam-Like Highly Porous Media"
- 2003 First Place, the Rafael Agosto Award for Advisors, the XIV Undergraduate Research Symposium, San Juan, Puerto Rico.
- 2003 Special Merit Award, Model Institutions for Excellence, the XIV Undergraduate Research Symposium, San Juan, Puerto Rico.
- 2003 Best Oral Presentation by Undergraduate Students, the Physical Science and Mathematics Category, the Rafael Agosto Award, the XIV Undergraduate Research Symposium, San Juan, Puerto Rico. 32 universities competed

Mentoring Experience

- M. Turgay Pamuk, Ph.D., Assistant Professor, Mechanical Engineering, Piri Reis University, İstanbul, Turkey, 2015-present
- Altay Arbak, Istanbul Technical University, visiting doctoral student at UDM, 2018-2019
- Yasha Parvini, Assistant Professor, Mechanical Engineering, UDM, 2016 – present
- Özer Bağcı, PhD., Post Doc, Mechanical Engineering, Ghent University, Belgium, 2014-present
- Mustafa Demir, Associate Professor of Math, UDM, 2014 – present
- Rosanne Burson, Associate Professor of Nursing, UDM, 2018 (Fulbright application and procedure)
- Ahmed Suleiman, Post Doc, Mechanical Engineering, UDM, 2014-2015
- 6 Doctoral students (4 at UDM, 2 at Istanbul Technical University)
- 14 MS students
- 17 Undergraduate research students

Service

Professional Service

1. Guest Editor, Journal of Materials Research, Focus Issue: Porous Metals: from Nano to Macro, October 2020
2. **General Chair, International Conference on Porous Metals and Metallic Foams, Dearborn, MI, August 21-23, 2019**
3. External reviewer of proposal: University of Wisconsin-Milwaukee, Research Growth Initiative, Invited by Vice Provost for Research, January 2017
4. Editorial Board Member, Advances in Mechanical Engineering (an international journal). Term ended Nov. 2016
5. Member (invited), International Scientific Advisory Board, Metal Foam Conference, Barcelona, Spain, August 31st to September 2nd, 2015.
6. Technical Session Organizer, ASME Power Conference, Boston, MA, July 29 - August 1, 2013
7. Member (invited), Organizing Committee, 8th International Conference on Porous Metals and Metallic Foams, North Carolina State University, Raleigh, NC, June 2013.

8. Session Chair (invited), 9th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Malta, July 16 - 18, 2012
9. Panelist (invited), NSF Graduate Fellowship Program, Washington, DC, Jan. 2012.
10. Member (invited), International Scientific Advisory Board, 7th International Conference on Porous Metals and Metallic Foams, Busan, Korea, September 18-21, 2011.
11. Session Chair (invited), 7th International Conference on Metal Foam, Busan, S. Korea, Sept. 18-21, 2011.
12. Panelist (invited), NSF Graduate Fellowship Program, Washington, DC, Feb. 2011.
13. Session Chair (invited), CELLMAT2010, Dresden, Germany, October 27-29, 2010.
14. Session Chair (invited), 7th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Antalya, Turkey, 19 - 21 July 2010.
15. Session Chair, ASEE Annual Conference, Honolulu, Hawaii, June 23-26, 2007.
16. Technical Session Organizer, 5th International Conference on Porous Metals and Metallic Foams, Montreal, Canada, September 5-7, 2007.
17. Judge (Invited): ASME District B Student Professional Development Conference, University of Michigan, Ann Arbor, MI, March 30- April 1, 2007.
18. Advisory Board Member (Invited), Perry Johnson Laboratory Accreditation, Inc., Southfield, MI, term ended 2007
19. Reviewer of Technical Papers for numerous engineering and science journals and conferences, on-going

Academic Service

- Member, College of Engineering and Science Doctoral Program Review Committee (Sept. 2018-)
- Member, Department of Mechanical Engineering Tenure and Promotion Committee (On-going)
- Member of delegation to the Heartland-Delta Faculty Conversations, February 24-26, 2017, Creighton University, Omaha, NE. Appointed by President Garibaldi. (UDM)
- Public Lecture: "How I Spent My Sabbatical," Colleague Development Days, August 17 & 18, 2016. (UDM)
- Public Lecture: "About My Fulbright Experience," E&S Research Colloquium, January 27, 2016. (UDM)
- Member, University Strategic Planning Committee, Term ended 2014. (UDM)
- Chair: University Graduate Program Review Committee, Term ended 2009. (UDM)
- Chair: College of Engineering and Science Tenure and Promotion Committee, Term ended 2012. (UDM)
- Coordinator of several mechanical engineering courses, 2005 to present. (UDM)
- Recruiter of graduate and undergraduate students from outside the university. 2005 to present. (UDM)
- Adviser and mentor to undergraduate and graduate students, 2005 to present. (UDM)
- Faculty advisor to ASHRAE student chapter, 2004 (UPRM).

Community Service

- Served as a Board of Directors member, the Detroit Institute of Arts- Asian Art, Term ended 2017.
- Engaged urban Detroit community through an engineering service-learning program in heat transfer. With the support and training provided by the community partner WARM Training Center, teams of students installed insulation materials in neighborhood houses

that could not afford to pay for them. The insulation kept people warm during cold months, conserved energy and saved on heating bills. 2006 to 2010. (UDM).

- Supervised senior engineering students, as part of an interdisciplinary team from civil, chemical and mechanical engineering as well as the biology and social sciences departments in the development of a water filter to improve the water quality for the Elaudio Andreu Community, Corozal, Puerto Rico. May 2004 (UPRM).

Public Relations and Media Coverage

- The service-learning work in my heat transfer course was highlighted in the newsletter of WARM Training Center of Detroit, March 2007.
- "Heat Transfer Analysis in Metal Foam with Low-Conductivity Fluid," was among the top ten most downloaded articles from the Journal of Heat Transfer during the month of August 2006 (784 times).
- My metal foam research was covered in public media: "10 research projects to watch," Crain's Detroit Business magazine, May 14, 2006. Only ten researchers were selected and interviewed from Southeast Michigan whose research may change the region's economy.

Software and Computer Skills

- Multiphysics: COMSOL
- CFD: FLOTherm
- Windows
- MS Office: Word, Excel, Power Point, Project
- MathCad, MatLab
- VISIO
- Refrigeration Utility Ware
- Data Acquisition Systems
- Blackboard/Knowledge

Affiliations

Member: ASME, SAE, ASHRAE, ASEE, Cryogenics Society of America, International Institute of Refrigeration

Certification and Training

- "Assessment Workshop," by Dr. Virginia Anderson, effective development of explicit criteria and rubrics for assessment of learning, Aug. 21, 2006
- "21st Century Pedagogy Principles Seminar," effective teaching strategies and learning activities for both classroom and online teaching, August 31, 2005.
- "Conducting Engineering Education Research," Workshop, Clemson University, 2002
- "Thermal Modeling of Electronic Systems," FLOTherm Short Course, Santa Clara, CA, 2000
- EPA: Certificate in safety and handling of refrigerants, 1999