Bruce Thomas Murray

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Education

P .D., Mec anical Engineering(Applied Mat ematics, Minor), Univ. of Arizona, 1986.

M.S., Mec anical Engineering, Rutgers University, 1980.

B.S., Mec anical Engineering, Rutgers University, 1978.

Professional Ex erience

Bartle Professor, Department of Mec anical Engineering, Bing amton University; 9/22–present.

Visiting Researc Faculty, Vellore Institute of Tec nology, 9/19–present.

C airman, Department of Mec anical Engineering, Bing amton University; 7/19–8/22..

Visiting Researc er, CDRH/OSEL Division of Applied Mec anics, U.S. Food and Drug Administration; 9/16-9/17.

Director of Undergraduate Studies, Department of Mec anical Engineering, Bing amton University; 8/14–8/16.

C airman, Department of Mec anical Engineering, Bing amton University; 6/13–8/14.

Visiting Teac ing Faculty, Vis wakarma Institute of Tec nology, Pune, India; 1/13.

Director of Undergraduate Studies, Department of Mec anical Engineering, Bing amton University; 9/06–5/09; 6/10–9/11.

Professor, Mec anical Engineering, Bing amton University; 9/06–present.

Visiting Faculty Researc Fellow, Oden Institute for Computational Engineering and Sciences, University of Texas at Austin; 8/04–8/11.

Founding Director, Materials Engineering Program, Bing amton University, 11/01–8/04.

Associate Professor, Mec anical Engineering, Bing amton University; 9/00–8/06.

Guest Researc er, Mat ematical and Computational Sciences Division, National Institute of Standards and Tec nology, Gait ersburg, Md.; 10/97–9/02.

Assistant Professor, Mec anical Engineering, Bing amton University; 8/97–8/00.

Researc Engineer, Mat ematical and Computational Sciences Division, National Institute of Standards and Tec nology, Gait ersburg, Md.; 10/88–6/97.

Assistant Professor, Department of Mec anical Engineering and Mec anics, Le ig University; 9/86–8/88.

Researc Assistant, Aerospace and Mec anical Engineering Department, University of Arizona, Tucson, Ariz.; 6/83–8/86.

Member of Tec nical Staff, Bell Laboratories, Holmdel, N.J.; 8/80–6/82.

Research Interests

Computational Modeling in Mec anobiology

T ermal Modeling Related to Electronics Packaging

Heat and Mass Transfer in Electrical Energy Storage Systems

Numerical Met ods for Free and Moving Boundary Problems

Computational Materials Science and Engineering

Courses Taught

ME 331 T ermodynamics (undergrad)
ME 351 Fluid Mec anics (undergrad)
ME 361 Manufacturing Processes (undergrad)
ME 403/303 Engineering Computational Met ods (undergrad)
ME 406 Engineering Sustainable Energy (undergrad)
ME 435 Aerodynamics (undergrad)
ME 491 Mec anical Engineering Lab (undergrad)
ME 498/499 Senior Project (Project Advisor)
ME 535 Analytical Met ods I (grad)
ME 536 Numerical Met ods (grad)
ME 541 Computational Fluids and Heat Transfer (grad)
ME 550 Fluid Mec anics (grad)
ME 571 Manufacturing Processes (grad)
ME 580C Computational Materials (grad)
MSE 564 Transport P enomena in Materials Processing (grad)

Honors and Awards

C ancellor's Award for Excellence in Service, 2020.

C ancellor's Award for Excellence in Teac ing, 2010.

J. Tinsley Oden Faculty Researc Fellows ip, University of Texas, Austin, 2005 & 2010.

Outstanding Paper Award International Journal of Numerical Met ods for Heat & Fluid Flow

NRC Postdoctoral Researc Fellows ip; 1988 – 1990.

University Graduate Fellows ip, University of Arizona; 1982 – 1985.

Member of Sigma Xi, Tau Beta Pi and Pi Tau Sigma Honor Societies.

B.S. Degree awarded wit Hig est Honors, 1978.

Current Research Grants

Mec anobiology of Myofibroblast Be avior in Healt and Disease, NSF-CMMI, Co-PI (PI G. Ma ler), Funding Period 9/19-8/23.

Partial List of Past Research Grants

Energy Efficient Electronic Systems, NSF-IUCRC, Co-PI (PI K. G ose), Funding Period 9/11-3/19.

Endot elial to Mesenc ymal Transformation Mec anobiology, NSF-CMMI, Co-PI (PI G. Ma ler), Funding Period 9/14-8/18.

Development of a Fully-Instrumented Self-Sensing and Self-Regulating Data Center, NSF-MRI, Co-PI (PI K. G ose), Funding Period 10/10-8/14.

T e Development of a Unique Experimental and Computational Modeling Approac for Studying Cellular Transformations Related to Cancer, Researc Foundation of t e State University, of New York, Co-PI (PI P. Huang), Funding Period 5/12-4/13.

C ip-Package Interactions on 3D-IC Learning Ve icle, Empire State Development Corp., Co-PI (PI SB Park), Funding Period 6/12-3/13.

Modeling Processing and T ermal Properties of Novel Materials for use in Electronics Packaging Applications, Integrated Electronics Engineering Center, New York State Center of Advanced Tec nology, PI, Funding Period 7/10-6/11.

Experimental C aracterization and Sequential Multi-Scale Modeling of Reactive Wetting, NSF-DMR, Co-PI (PI T.J. Singler), Funding Period 9/06-1/11.

Verified Predictive Modeling Tools for C emical, Biological and Enviromental Hazards Dispersion in t e Atmosp ere, Co-PIs B. T. Murray, B. Sammakia, Defense T reat Reduction Agency, DHS, Funding Period 2005-2008.

Integration of Polymer/Plastics Tec nologies across t e Curriculum, NSF-CCLI, Co-PI (PI - E.S. Stevens, C emistry), Funding Period 2003-2005.

Convective and Morp ological Instabilities During Crystal Growt , NASA Microgravity Materials Science, Co-PI (PI - G. B. McFadden), Funding Period 2000-2003.

An Experimental and T eoretical Study of Reactive Wetting in Low Melting Point Alloys, NSF-DMR, PI, Funding Period 1999-2002.

Coupled Growt in Hypermonotectics, Subcontract to NASA/MSFC NAS8-99059 t roug t e University of Alabama at Birming am (PI - J.B. Andrews), Funding Period 1999-2003.

Nonlinear Calculations of T ermosolutal Convection during Directional Solidification, NIST/Materials Science and Engingeering Laboratory, PI, Funding Period 1998-2001.

Reliability of Lead-Free Solder Joints wit Different Metallizations in Microelectronic Interconnects, Integrated Electronics Engineering Center, SUNY at Bing amton, Co-PI wit E.J. Cotts (P ysics Department), Funding Period 1999-2000.

Wetting of Lead-Free Solders for Microelectronic Interconnects Tec nologies, Integrated Electronics Engineering Center, SUNY at Bing amton, Co-PI wit T.J. Singler, Funding Period 1998-2000.

Interface Morp ology during Crystal Growt : Effects of Anisotropy and Fluid Flow, NASA, Microgravity Fluid P ysics, Co-PI (PI - S. R. Coriell), Funding Period 1996-99.

Patents

Devices and Fluid Flow Met ods for Improving Mixing, B opte S., Sammakia B. and Murray B., U.S. Patent Number: 8,277,112

Publications

A) Ar hival Journals(Over 4 itations on Google S holar)

1. B.T. Murray and C.F. C en, Double-diffusive convection in a porous medium, *Journal of Fluid Mecha ics*, **201**, pp. 147-166, 1989.
2. K.D. Step anoff, J.S. Perkins, and B.T. Murray, Mixing en ancement in flow past rectangular cavities as a result of periodically pulsed fluid motion, *IEEE Tra sactio s o Compo e ts, Hybrids a d Ma ufacturi g Tech ology* **12**, pp. 766-771, 1989.
3. G.B. McFadden, B.T. Murray, and R.F. Boisvert, Elimination of Spurious Eigenvalues in t e C ebys ev Tau Spectral Met od, *Jour al of Computatio al Physics*, **91**, pp. 228-239, 1990.
4. G.B. McFadden, S.R. Coriell, B.T. Murray, M.E. Glicksman, and M.E. Selleck, Effect of a Crystal-Melt Interface on Taylor-Vortex Flow, *Physics of Fluids A* **2**, pp. 700-705, 1990.
5. B.T. Murray, G.B. McFadden, and S.R. Coriell, Stabilization of Taylor-Couette Flow due to Time-Periodic Outer Cylinder Oscillation, *Physics of Fluids A*, **2**, pp. 2147-2156, 1990.
6. B.T. Murray, S.R. Coriell, and G.B. McFadden, T e Effect of Gravity Modulation on Solutal Convection During Directional Solidification, *Jour al of Crystal Growth*, **110**, pp. 713-723, 1991.

11. B.T. Murray, S.R. Coriell, G.B. McFadden, A.A. W eeler, and T e Effect of Gravity Modulation on Convection in Vertical Bridgman Growt , *Microgravity - Scie ce a d Tech ology*, **6**, pp. 70-73, 1993.

12. R.J. Braun, G.B. McFadden, B.T. Murray, S.R. Coriell, M.E. Glicksman, and M.E. Selleck, Asymptotic Be avior of Modulated Taylor-Couette Flows wit a Crystalline Inner Cylinder, *Physics of Fluids A*, **5**, pp. 1891-1903, 1993.

13. A. A. C ernov, S.R. Coriell, and B.T. Murray, Morp ological Stability of a Vicinal Face Induced by Step Flow, *Jour al of Crystal Growth*, **132**, pp. 405-413, 1993.

14. S-L. Wang, R.F. Sekerka, A.A. W eeler, B.T. Murray, S.R. Coriell, R.J. Braun, and G.B. McFadden, T ermodynamically-Consistent P ase-Field Models for Solidification, *Physica D*, **69**, pp. 189-200, 1993.

15. W. J. Boettinger, A.A. W eeler, B.T. Murray, and G.B. McFadden, Prediction of Solute Trapping at Hig Solidification Rates Using a Diffuse Interface P ase-Field T eory of Alloy Solidification, 48(Be Sa)47(132)4 ... Braun, and5line pp. 482(Beha)47(

25. K. W. Moon, W. J. Boettinger, M. E. Williams, D. Josell, B.T. Murray, W. C. Carter, and C. A. Handwerker, Dynamics Aspects of Wetting Balance Tests, *J. Electro ic Packagi g*, **118**, pp. 174-183, 1996.

26. D. Josell, A. Cezairliyan, D. van Heerden, and B.T. Murray, T ermal Diffusion T roug Multilayer Coatings: T eory and Experiment *Na oStructured Materials*, **9**, pp. 727-736, 1997.

27. R.J. Braun and B.T. Murray, Adaptive P ase-Field Computations of Dendritic Crystal Growt , *Jour al of Crystal Growth*, **174**, pp. 41-53, 1997.

28. D. Josell, A. Cezairliyan, D. van Heerden, and B.T. Murray, An Integral Solution for T ermal Diffusion in Periodic Multilayer Materials: Application to Iron/Copper Films, *I t. J. Thermophysics*, **18**, pp. 865-885, 1997.

29. S.R. Coriell, W.F. Mitc ell, B.T. Murray, J.B. Andrews, and Y. Arikawa, Analysis of Monotectic Growt : Infinite Diffusion in t e L_2-P ase, *Jour al of Crystal Growth*, **179**, pp. 647-657, 1997.

30. R.J. Braun, B.T. Murray, and J. Soto, Adaptive Finite-Difference Computations of Dendritic Growt Using a P ase-Field Model, *Modeli g a d Sim. i Matls Sci.*, **5** 365-380, 1997.

31. S.R. Coriell, A. A. C ernov, B.T. Murray, and G.B. McFadden, Step Bunc ing: Generalized Kinetics, *Jour al of Crystal Growth*, **183**, pp. 669-682, 1998.

32. S.R. Coriell, B.T. Murray, A. A. C ernov, and G.B. McFadden, T e Effect of S ear Flow on t e Morp ological Stability of a Vicinal Face: Growt from a Supersaturated Solution, *Adv. Space Res.*, **22**, pp. 1153-1158, 1998.

33. A.A. W eeler and B.T. Murray, T e Disturbance of T ermosolutal Convection by g-Jitter, *Microgravity - Scie ce a d Tech ology*, **11**, pp. 96-100, 1998.

34. B.T. Murray, S.R. Coriell, G.B. McFadden, and A. A. C ernov, T e Effect of Oscillatory S ear Flow on Step Bunc ing, *Jour al of Crystal Growth*, **218**, pp. 434-446, 2000.

35. S.R. Coriell, G.B. McFadden, W.F. Mitc ell, B.T. Murray, J.B. Andrews, and Y. Arikawa, Effect of Flow due to Density C ange on Eutectic Growt , *Jour al of Crystal Growth*, **224**, pp. 145-54, 2001.

36. S. P. Watson, B.T. Murray, and B. G. Sammakia, Computational Parameter Study of C ip Scale Package Array Cooling, *IEEE Tra sactio s o Compo e ts a d Packagi g Tech ologies*,**24**, pp. 184-190, 2001.

37. L.N. Brus and B.T. Murray, Crystal Growt wit Applied Current, *Jour al of Crystal Growth*, **250**, pp. 170-174, 2003.

40. L. Yin, B.T. Murray and T.J. Singler, Dissolutive Wetting in t e Sn-Bi System, Acta Mater., **54**, pp. 3561-3574, 2006.

41. J.W. Peterson, G.F. Carey, D.J. Knezevic and B.T. Murray, Adaptive Finite Element Met odology for Tumor Angiogenesis Modeling, International Journal for Numerical Met ods in Engineering, **69**, pp. 1212-1238, 2007.

42. R.H. Stogner, G.F. Carey, and B.T. Murray, Approximation of Ca n-Hilliard diffuse interface models using parallel adaptive mes refinement and coarsening wit C^1 elements, International Journal for Numerical Met ods in Engineering, **76**, pp. 636-661, 2008.

43. S. Su, L. Yin, Y. Sun, B.T. Murray and T.J. Singler, Modeling Dissolution and Spreading of Sn-Bi Alloy Drops on a Bi Substrate, Acta Mater.,**57**, pp. 3110-3122, 2009.

53. X. Xu, M.M. Myers, B. Sammakia and B.T. Murray, Performance and Reliability Analysis of Hybrid Concentrating P otovoltaic/T ermal Collectors wit a Tree-S aped C annel Network Cooling System, IEEE Transactions on Components, Packaging and Manufacturing Tec nology, **3**, pp. 967-977, 2013.

54. S. Pisipati, J. Geer, B. Sammakia and B.T. Murray, Multiscale T ermal Device Modeling using Diffusion in t e Boltzmann Transport Equation, International Journal of Heat and Mass Transfer, **64**, pp. 286-303, 2013.

55. Z. Song, B.T. Murray and B. Sammakia, A Compact Model for Data Center Analysis using t e Zonal Met od, Numerical Heat Transfer, Part A, **64**, pp. 361-377, 2013 DOI:10.1080/10407782.2013.784138.

56. Z. Song, B.T. Murray and B. Sammakia, Airflow and Temperature Distribution Optimization in Data Centers, using Artificial Neural Networks, International Journal of Heat and Mass Transfer, **64**, pp. 80-90, 2013.

57. D. Homentcovsc i, B.T. Murray and R.N. Miles, Viscous damping of regularly perforated MEMS microstructures outside t e lubrication approximation: optimum number of oles and t e edge correction, Sensors and Actuators A, **201**, pp. 281-288, 2013.

58. Z. Song, B.T. Murray and B. Sammakia, Numerical Investigation of Inter-zonal Boundary Conditions for Data Center T ermal Analysis, International Journal of Heat and Mass Transfer, **68**, pp. 649-658, 2014.

59. Z. Song, B.T. Murray and B. Sammakia, A Dynamic Compact T ermal Model for Data Center Analysis and Control using t e Zonal Met od and Artificial Neural Networks, Applied T ermal Engineering, **62**, pp. 48-57, 2014.

60. Z. Song, B.T. Murray and B. Sammakia, Long-Term Transient T ermal Analysis using Compact Models for Data Center Applications, International Journal of Heat and Mass Transfer, **71**, pp. 69-78, 2014.

61. X. Xu, S. Z ou, M.M. Myers, B. Sammakia and B.T. Murray, Performance Analysis of a Combination System of Concentrating PV/T Collector and TEGS, Journal of Electronics Packaging, **136**, 041006:1-7, 2014.

62. T. Gao, B. Sammakia, B.T. Murray, A. Ortega and B. Sc midt, Cross Flow Heat Exc anger Modeling of Transient Temperature Input Conditions, IEEE Transactions on Components, Packaging and Tec nology, **11**, pp. 1796-1807, 2014.

63. T. Gao, B.T. Murray and B. Sammakia, Analysis of Transient and Hysteresis Be aviors of Cross Flow Heat Exc angers under Variable Fluid Mass Flow Rate for Data Center Cooling, Applied T ermal Engineering, **84**, pp. 15-26, 2015.

64. S.G. Mina, W. Wang, Q. Cao, P. Huang, B.T. Murray and G.J. Ma ler, S ear stress magnitude and transforming growt factor-beta 1 regulate endot elial to mesenc ymal transformation in a t ree-dimensional culture microfluidic device, RSC Advances, **6** 85457-85467, 2016.

65. K. Nemati, H.A. Alissa, B.T. Murray, B. Sammakia, R. Tipton and M. Seymour, Compre ensive Experimental and Computational Analysis of a Fully-Contained Hy-

brid Server Cabinet, Journal of Heat Transfer, **139**, 082101-12, 2017. DOI:10.1115/1.4036100

66. K. Nemati, H.A. Alissa, B.T. Murray, K. Sc neebeli, and B. Sammakia. Experimental Failure Analysis of a Rear Door Heat Exc anger wit Localized Containment. IEEE Components, Packaging and Manufacturing Tec nology, **7**, pp. 882-892, 2017. DOI: 10.1109/TCPMT.2017.2682863.
67. S. Da al, P. Huang, B.T. Murray and G.J. Ma ler, Endot elial to Mesenc ymal Transformation is induced by Altered Extracellular Matrix in Aortic Valve Endot elial Cells, Journal of Biomaterials Researc : Part A, **105**, pp. 2729-2741, 2017.
68. S.G. Mina, P. Huang, B.T. Murray and G.J. Ma ler, T e role of s ear stress and altered tissue properties on endot elial to mesenc ymal transformation and tumor-endot elial cell interaction, Biomicrofluidics, **11**, 044104, 2017.
69. S.A.R. Dibaji, S. Gu a, A. Arab, B.T. Murray and M.R. Myers, Accuracy of Commercial Electric Nicotine Delivery Systems (ENDS) Temperature Control, PLOS one, November 5, 2018. ttps://doi.org/10.1371/journal.pone.0206937
70. D. Homentcovsc i and B.T. Murray, Explicit resistance matrix for a Hall disk wit multiple perip eral contacts: Application to a van der Pauw type met od for extended contacts, Sensors and Actuators A, **294**, 2019. ttps://doi.org/10.1016/j.sna.2019.04.027
71. M. C owkwale, G.J. Ma ler, P. Huang and B.T. Murray, A Multiscale In Silico Model of Endot elial to Mesenc ymal Transformation in a Tumor Microenvironment, J. T eoretical Biology, **480**, pp. 229-240, 2019. ttps://doi.org/10.1016/j.jtbi.2019.08.012
72. D. Homentcovsc i and B.T. Murray, Basic relations ips for Hall alf-plane structures wit multiple extended contacts on t e boundary: Applications to t e extraction of p ysical parameters and optimization of grap ene and vertical Hall devices, Solid State Electronics, **171** 107837, 2020, ttps://doi.org/10.1016/j.sse.2020.107837
73. B. Bozorgme r and B.T. Murray, Numerical Simulation of Evaporation of Et anol-Water Mixture Droplets on Isot ermal and Heated Substrates, ACS Omega, ao-2021-005455, 2021. ttps://doi.org/10.1021/acsomega.1c00545
74. Dorel Homentcovsc i, Radu Oprea and Bruce T. Murray, Resistance matrix for an anisotropic Hall plate wit multiple extended asymmetric contacts on t e boundary, Journal of Applied Mat ematics and P ysics, **9**, pp. 1911-1925, 2021. ttps://doi.org/10.4236/jamp.2021.98125
75. S. Da al, J. Bramsen, B. Alder, B.T. Murray, P. Huang, M.-H. C en, G.J. Ma ler, C ondroitin Sulfate Promotes Interstitial Cell Activation and Calcification in an *i Vitro* Model of t e Aortic Valve, Cardiovascular Engineering and Tec nology, BMES 2021, ttps://doi.org/10.1007/s13239-021-00586-z
76. Dorel Homentcovsc i, Romeo Bercia and Bruce T. Murray, Analysis of a Hall-Corbino disk plate aving a point current source at t e center, Solid State Electronics, **186**, 108179, 2021. ttps://doi.org/10.1016/j.sse.2021.108179

77. Dorel Homentcovsc i and Bruce T. Murray, Determination of t e Hall voltage for t e case of a Hall plate aving a piecewise constant Hall angle, ZAMP, **73**, 198, 2022. ttps://doi.org/10.1007/s00033-022-01836-3

78. J. Bramsen, B. Alder, Melissa Mendoza, B.T. Murray, M.-H. C en, P. Huang, G.J. Ma ler, Glycosaminoglycans affect endot elial to mesenc ymal transformation,

catio s i Free Bou dary Problems, Pitman Researc Notes in Mat ematics, **280**, J.M. C adam and H. Rasmussen, eds., (Longman Group UK, 1993) pp. 105–119.

10. G.B. McFadden, S.R. Coriell, and B.T. Murray, T e Rayleig instability for a cylindrical crystal-melt interface, in *Variatio al a d Free Bou dary Problems*, T e IMA Volumes in Mat ematics and Its Applications, **53**, A. Friedman and J. Spruck, eds., (Springer-Verlag, New York, 1993) pp. 159–169.
11. W. J. Boettinger, A.A. W eeler, B.T. Murray, G.B. McFadden, and R. Kobayas i, Calculation of Alloy Solidification Morp ologies Using t e P ase-Field Met od, in *Modeli g of Casti g, eldi g, a d Adva ced Solidificatio Processes VI*, T. S. Piwonka, V. Voller and L. Katgerman, eds., (T e Minerals, Metals, & Materials Society, 1993) pp. 79–86.
12. B.T. Murray, A.A. W eeler, W. J. Boettinger, and G.B. McFadden, Computation of Dendritic Solidification Using a P ase-Field Model, in *Heat Tra sfer i Melti g, Solidificatio , a d Crystal Growth*, **HTD–234**, I.S. Habib and S. T ynell, eds., (ASME, New York, 1993) pp. 67–76.
13. S.R. Coriell, B.T. Murray, G.B. McFadden, and K. Leonartz, Convective and morp ological stability during directional solidification a5ing a5itM1(et) andesses VI

Solidificatio , P. E r ard, D.S. Riley and P.H. Steen, eds., (Kluwer, Dordrec t, 2001) pp.195-208.

21. C.S. Hogea, B.T. Murray and J.A. Set ian, Computational Modeling of Solid Tumor Evolution via a General Cartesian Mes /Level Set Met od, Report 05-29, Institute for Computational Engineering and Sciences, T e University of Texas at Austin, July 2005.
22. D.A. Davidson, G.L. Le mann and B.T. Murray, Study of a Gel T ermal Interface Material wit Micro-Sized Particles, Proceedings of t e 10t IT erm Conference, San Diego, CA, pp. 497-504, 2006.
23. S. B opte, B. Sammakia and B.T. Murray, Mixing En ancement of Two Component Microc annel flow– Geometric and Pulsed Flow Effects, Proceedings of IMECE 2007 (ASME International Mec anical Engineering Congress and Exposition), Seattle, Was ington, paper IMECE2007-43387.
24. F. Z ou, P. Arunasalam, B.T. Murray and B. Sammakia, Heat Transport in T ermal Interface Materials En anced wit MEMS based Microinterconnects, IT erm Proceedings, IEEE, May 2008.
25. S. B opte, B. Sammakia and B.T. Murray, Geometric Modification to Simple Microc annel Design for En anced Mixing, Proceedings of t e Inter-Society Conference on T ermal and T ermomec anical P enomena in Electronic Systems (IT erm), Orlando, Florida, IEEE, May 2008.
26. S. B opte, B. Sammakia and B.T. Murray, Application of Two-Way Split Flow Design Tec niques to Simple Microc annel Geometries for En anced Mixing, Proceedings of t e 3rd Frontiers in Biomedical Devices Conference, ASME BioMed2008-38096, Irvine, CA, July 2008.
27. R.T.R. McGrann and B.T. Murray, Improving an ABET Course Assessment Process t at Involves Marker Problems and Projects, Proceedings of t e ASEE Annual Conference, Austin, Texas, June 2009.
28. M. Ibra im, S. Gondipalli, S. B opte, B. Sammakia, B.T. Murray, K. G os , M. Iyengar and R. Sc midt, Numerical Modeling Approac to Dynamic Data Center Cooling, Proceedings of IEEE ITHERM, Las Vegas, June 2010.
29. M. Ibra im, S. B opte, B. Sammakia, B.T. Murray, M. Iyengar and R. Sc midt, Effect of T ermal C aracteristics of Electronic Enclosures on Dynamic Data Center Performance, Proceedings of IMECE 2010 (ASME International Mec anical Engineering Congress and Exposition), Vancouver, Britis Columbia, paper IMECE2010-40914.
30. Z. Song, B.T. Murray and B. Sammakia, Multi-Variate Prediction of Airflow and Temperature Distributions using Artificial Neural Networks, Proceedings of t e ASME InterPACK Conference, IPACK2011-52167, Portland, Oregon, July 2011.
31. M. Ibra im, F. Afram, B. Sammakia, K. G os , B.T. Murray, M. Iyengar and R. Sc midt, C aracterization of a Server T ermal Mass using Experimental Measurements, Proceedings of t e ASME InterPACK Conference, IPACK2011-52165, Portland, Oregon, July 2011.

32. M. Ibra im, B. Sammakia, S. B opte, B.T. Murray, M. Iyengar and R. Sc midt, Numerical Study on t e Reduction of Recirculation using Sealed Cold Aisles and its Effects on t e Efficiency of t e Cooling Infrastructure, Proceedings of t e ASME InterPACK Conference, IPACK2011-52166, Portland, Oregon, July 2011.

33. X. Xu, B. Sammakia, B.T. Murray, D.-Y. Jung and T. Eilertsen, T ermal Modeling and Heat Management of Supercapacitor Modules by Hig Velocity Impinging Fan Flow, Proceedings of t e IMECE, IMECE2011-65676, Denver, Colorado, November 2011.

4. Double-Diffusive Convection in a Horizontal Layer of Porous Medium, National Institute of Standards and Tec nology, Gait ersburg, Md., December 1988.
5. Convection Effects in Solidification Problems, Department of Mec anical Engineering Colloquium, Jo ns Hopkins University, Baltimore, Md., November 1989.
6. Convection Effects in Solidification Problems, Department of Mec anical Engineering Seminar, University of Maryland, February 1990.
7. Applications of Floquet T eory in Hydrodynamics, National Institute of Standards and Tec nology, Gait ersburg, Md., February 1990.
8. T ermosolutal Convection in a Layer of Porous Medium, Department of Mec anical Engineering, SUNY Stony Brook, N.Y., Marc 1990.
9. Temporally Modulated Convection in Directional Solidification, Department of Mec anical Engineering Seminar, Howard University, Was ington D.C., April 1990.
10. Temporally Modulated Convection in Solidification Problems, Department of Mec anical, Industrial and Nuclear Engineering, University of Cincinnati, Cincinnati, O io, May 1990.
11. Temporally Modulated Convection in Directional Solidification, Aac en Center for Solidification in Space, Aac en, W. Germany, July 1990.
12. Effects of Temporal Modulation on Solidification Flows, Mat ematics and Computer Science Colloquium, Clarkson University, Potsdamn, N.Y., November 1990, and as a visitor at t e IMA, University of Minnesota, Minneapolis, Minn., December 1990.
13. Temporally Modulated Convection in Solidification Problems, Department of Mec anical and Industrial Engineering Seminar, University of Illinois at Urbana-C ampaign, April 1991.
14. T e Effect of Modulation on Convection, Department of Mec anical and Aerospace Engineering, University of Arizona, Tucson, Arizona, Marc 1992.
15. Calculation of Solidification Morp ologies using a P ase-Field Model, Center for Microgravity and Materials Researc , University of Alabama, Huntsville, December 1992.
16. Effects of Modulation on T ermosolutal Convection during Directional Solidification, Department of C emical Engineering, University of Florida, Gainesville, Florida, October 1993.
17. Calculation of Solidification Morp ologies using a P ase-Field Model, Department of C emical Engineering, Massac usetts Institute of Tec nology, June 1994.
18. T e Effect of Modulation on Convection during Directional Solidification, Department of C emical Engineering, Cornell University, It aca, New York, June 1994.
19. S arp-Interface versus P ase-Field Met ods for Solidification Modeling: Is t e Distinction Becoming Diffuse?, Applied and Computational Mat ematics Division, NIST, January 1995.
20. P ase-Field Models of Solidification, Dept. of Materials, Ecole Polytec nique Federale, Lausanne, Switzerland, April 1995.

21. Computational Modeling of Heat and Mass Transfer in Solidification Processing, Department of Mec anical, Aerospace and Nuclear Engineering, University of California, Los Angeles, June 1995.
22. Computational Modeling in Materials Processing, Department of Mec anical Engineering, University of Sout Carolina, Columbia, Marc 1997.
23. Computational Tec niques for Solidification Micro-Modeling, University of Wisconsin, Milwaukee, Marc , 1997.
24. Computational Modeling of Dendritic Solidification, Was ington State University, Pullman, Was ington, Marc 1997.
25. P ase-Field Modeling of Solidification Microstructure, Dept. of Mec anical Engineering, SUNY Bing amton, April 1997.
26. Computational Modeling of Dendritic Solidification, NASA Mars all Space Flig t Center, Huntsville, Alabama, May 1997.
27. Spreading and Reactive Wetting of Tin-Based Solders, Department of Mec anical Engineering, Sout ern Met odist University, Dallas, Texas, Marc 2001.
28. Computational Modeling of Tumor Growt using t e Level-Set Met od, Department of Aerospace and Mec anical Engineering, University of Arizona, Tucson, Arizona, November 2004.
29. T e P ase-Field Met od for Modeling Solidification, Institute for Computational Engineering and Sciences, University of Texas at Austin, Austin, Texas, November 2004.
30. Computational Modeling of Material Microstructure: Applications in Crystal Growt and Tumor Evolution, University of Texas at San Antonio, San Antonio, Texas, Marc 2005.
31. Simulation of Tumor Growt Be avior using Continuum Based Transport Models, Department of C emical Engineering, Cornell University, It aca, New York, November 2006.
32. Computational Modeling of Multip ase Transport, Watson Sc ool Seminar, Bing- amton University, Bing amton, New York, Marc 2008.
33. Computational Modeling of Multiscale, Multip ase Transport, Department of Mec anical and Industrial Engineering, Texas A&M University-Kingsville, Texas, April 2010.
34. Simulation of Tumor Growt Be avior using Continuum Based Transport Models, Department of Bioengineering, SUNY, Bing amton, New York, December 2010.
35. T ermal Modeling of 3D Packaging, Vis wakarma Institute of Tec nology, Pune, India, January 2013.
36. Energy-Efficiency Improvements for Data Centers, VIT University, Vellore, India, August 2014.
37. T e Center for Learning and Teac ing at Bing amton University, Vellore, India, August 2014.

38. T ermal Management Applied to Data Centers, SASE Bing amton University, Marc 2015.
39. In vitro and in silico modeling of EndMT, Division of Applied Mec anics seminar, FDA/CDRH/OSEL, December 2016.
40. T ermal and C emical C aracterization of Aerosols Produced by Electronic Cigarettes, Department of Mec anical Engineering Seminar, Bing amton University, September 2017.
41. Lit ium-Ion Battery T ermal Analysis and Management, Bing amton University-Vellore Institute of Tec nology Webinar Series on Autonomous Systems, Marc 2021.

) Invited and ontributed Presentations and Posters

1. Double-Diffusive Instability in a Horizontal Layer of Porous Medium, 37t APS/DFD Meeting, Providence, R ode Island, November 1984.
2. Variable Property Effects on t e Onset of t e Double-Diffusive Instability in a Horizontal Layer of Porous Medium, 38t APS/DFD Meeting, Tucson, Arizona, November 1985.
3. Nonlinear Double-Diffusive Convection in a Horizontal Layer of Porous Medium, 10t U.S. National Congress of Applied Mec anics, Austin, Texas, June 1986.
4. Nonlinear Double-Diffusive Convection in a Horizontal Layer of Porous Medium, 39t APS/DFD Meeting, Columbus, O io, November 1986.
5. Solutal Convection During Directional Solidification: g-Jitter, Sevent International Conference on P ysico-C emical Hydrodynamics, Cambridge, Massac usetts, June 1989.

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12. T e Effect of Gravitational Modulation on Convection in Vertical Bridgman Growt , VIIIt European Symposium on Materials and Fluid Sciences in Microgravity, Brussels, Belgium, April 1992.
13. Gravitational Modulation of T ermosolutal Convection During Directional Solidification, 29t COSPAR Meeting, Symposium on Microgravity Researc : Material and Fluid Sciences, Was ington, D.C., September 1992.
14. Modulated T ermosolutal Convection during Directional Solidification, 45t APS/DFD Meeting, Talla assee, Florida, November 1992.
15. P ase-Field Computations for t e Solidification of a Pure Material, Poster and video tape presentation at t e Gordon Researc Conference on Crystal Growt , Oxnard, California, Marc 1993.
16. Modulated Convection in Directional Solidification, (Invited) April Meeting of t e American P ysical Society, Was ington, D.C., April 1993.
17. Morp ological Stability: Interaction of Anisotropic Kinetics and S ear Flows, 9t American Conference on Crystal Growt , Baltimore, Maryland, August 1993.
18. Computation of Complex Solidification Morp ologies Using a P ase-Field Model, 29t ASME/AIC E National Heat Transfer Conference, Atlanta, Georgia, August 1993.
19. Convective Instabilities during Directional Solidification: Effect of Gravity Modulation, (Invited) Symposium on "Microgravity Solidification: T eory and Experimental Results , at t e TMS/ASM Meeting, Pittsburg , Penn., October 1993.

27. Modeling t e Effects of Kinetic Anisotropy and Oscillatory S ear Flow on Interface Stability, Elevent American Conference on Crystal Growt , Tucson, Arizona, August 1999.

28. T e Effect of Oscillatory Flow in Crystal Growt Models, (Invited) ASM Matericals Conference, Cincinnati, O io, October 1999.

29. Modeling Convection during Monotectic Growt , 52nd APS/DFD Meeting, New Orleans, Louisiana, November 1999.

30. Modeling Convection during Monotectic Growt , 37t Annual Tec nical Meeting, Society of Engineering Science, Columbia, Sout Carolina, October 2000.

31. Flow Effects during Directional Solidification of Monotectic Alloys, 53nd APS/DFD Meeting, Was ington, D.C., November 2000.

32. Modeling Convection during Monotectic Growt , 13t American Conference on Crystal Growt , Burlington, Vermont, August 2001.

33. Reactive Wetting and Spreading in Solder Systems (Invited), 14t National Congress on T eoretical and Applied Mec anics, Blacksburg, Virginia, June 2002.

34. A Simple Level Set Implementation for Computational Modeling of Tumor Growt , SIAM Annual Meeting, Portland, Oregon, July 2004.

35. Computational Tec niques for Moving Boundary Problems, (Invited) ERDC Finite Element Works op, U.S. Army Engineering Researc and Development Center, Vicksburg, Mississippi, April 2005.

36. P ase Field Modeling of Solidification Microstructures, (Invited) UNM/LANL Solidification Modeling Works op, Santa Fe, New Mexico, April 2005.

37. T ree-Dimensional, Adaptive Finite Element Simulations of T ermosolutal Convection in Porous Media, (Invited) 8t U.S. National Congress on Computational Mec anics, University of Texas, Austin, Texas, July 2005.

38. Adaptive Finite Element Modeling of Transport in Tumor Evolution, 8t U.S. National Congress on Computational Mec anics, University of Texas, Austin, Texas, July 2005.

39. Improving an ABET Course Assessment Process t at Involves Marker Problems and

Annual Meeting, Denver, Colorado, JulyPr(T)82(exas,)-1. Numerical Studyang334(No)27(v)
Networkmput(VicIEEE)-327(ITHERM2012)-326(Conference,)-327(San)-326(Diego,)-327(

University ervice

C air, Senior IPC Committee, Department of Biomedical Engineering, 2019-20

Lead on t e Watson Sc ool collaboration wit VIT Vellore on Autonomous Ve icles

Member, Middle States Accreditation Working Group VII, 2019-2020

Member, Watson Sc ool Ad Hoc Committee on Faculty Development/Assessment, 2015

Member, IPC Committee, Department of Biomedical Engineering, 2015-16, 2021-22

Member, Smart Energy TAE Steering Committee, 2013-2015

Graduate Sc ool Outside Examiner, P D Dissertations, 2002-present

C air, University Personnel Committee, 2011-2012

C air, Faculty Searc Committee, 2006-2007

Member, Faculty Searc Committee, 2004-2005

Member, Graduate Studies Committee, 2002-2004

C air, Faculty Searc Committee, 2001-2002

Member, Faculty Searc Committee, 2000-2001

Graduate tudents Com leted

Kouros Nemati, P .D. Dissertation Title: Experimental and Computational Studies on t e Role of Confinement Systems in Data Center T ermal Management , December 2016.

Be nam Bozorgme r, M.S, T esis Title: Evaporation of Pure Water and Et anol-Water Mixture Droplets on Isot ermal and Heated Substrates, a Numerical Approac , August 2106.

Bryan Rossi, M.S., T esis Title: "Modeling of a T ermoelectric Rotating Gas Burner , May 2015.

Z i ang Song, P .D. Dissertation Title: "Compact Models for Real-Time Modeling and Control of Data Centers , December 2014. Current Position–Associate Professor, Nort eastern University, S enyang City, Liaoning, C ina.

Qingfeng Cao, M.S., T esis Title: "Multi-Scale Mec anobiology Modeling of Cellular Be avior , August 2013.

Daniel Ferrone, M.S., T esis Title: "Compact T ermal Modeling in 3D Electronics Packaging , May 2013.

S un Su, P .D., Dissertation Title:"T e development of computational models for studying wetting, evaporation and t ermal transport for small scale systems packaging applications , November 2011. Current Position: Hardware Engineer, Apple, Santa Clara, CA.

Sang Kim, M.S., T esis Title:"Effectiveness of Specialized Floor Tile Designs on Air Flow Uniformity , May 2011.

Sidd art B opte, P .D.,Dissertation Title: " Study of Transport Processes from Macroscale to Microscale , August, 2009; Co-Advisor wit B. Sammakia. Current Position: Microsoft, Redmond, Was ington.

Fan Z ou, M.S., T esis Title: "Modeling Heat Transport in T ermal eir(eir(ocpss)-3bscale)0123(Ti3bs

10. Ian Claydon, Department of Mec anical Engineering, SUNY Bing amton, 2018; Advisor: B. Sammakia.
11. Mik ail Coloma, Department of Mec anical Engineering, SUNY Bing amton, 2017; Advisors: P. C iarot and P. Huang.
12. Suraj Maganty, Program in Materials Science and ENgineering, SUNY Bing amton, 2017; Advisor: J. C o.
13. Wen ui Z u, Program in Material Science and Engineering, SUNY Bing amton, 2016; Advisor: G. Z ou.
14. Sara Mina, Department of Biomedical Engineering, SUNY Bing amton, 2016; Advisor: G. Ma ler.
15. Sudip Da al, Department of Biomedical Engineering, SUNY Bing amton, 2016; Advisor: G. Ma ler.
16. Husam Alissa, Department of Mec anical Engineering, SUNY Bing amton, 2016; Advisor: B. Sammakia.
17. Tianyi Gao, Department of Mec anical Engineering, SUNY Bing amton, 20015; Advisor: B. Sammakia.
18. C eng C en, Department of Mec anical Engineering, SUNY Bing amton, 2015; Advisor: B. Sammakia.
19. Liang Li, Program in Material Science and Engineering, SUNY Bing amton, 2015; Advisor: G. Z ou.
20. Sami Alk arabs e , Department of Mec anical Engineering, SUNY Bing amton, 2014; Advisor: B. Sammakia.
21. Wei Wang, Department of Mec anical Engineering, SUNY Bing amton, 2014; Advisor: P. Huang.
22. Anjali C au an, Department of Mec anical Engineering, SUNY Bing amton, 2014; Advisor: B. Sammakia.
23. Xinqiang Xu, Department of Mec anical Engineering, SUNY Bing amton, 2013; Advisor: B. Sammakia.
24. Langli Luo, Department of Mec anical Engineering, SUNY Bing amton, 2012; Advisor: G. Z ou.
25. Subbalaks mi Pisipati, Department of Mec anical Engineering, SUNY Bing amton, 2012; Advisor: B. Sammakia.
26. Abra am Howell, Department of Mec anical Engineering, SUNY Bing amton, 2012; Advisor: R. McGrann.
27. Ma moud Ibra im, Department of Mec anical Engineering, SUNY Bing amton, 2012; Advisor: B. Sammakia.
28. Bo Dan, Department of Mec anical Engineering, SUNY Bing amton, 2012; Advisor: B. Sammakia.

29. Harry Sc oeller, Department of Mec anical Engineering, SUNY Bing amton, 2011; Advisor: J. C o.
30. David Rae, Program in Material Science and Engineering, SUNY Bing amton, Expected 2011; Committee C air; Advisor: E. J. Cotts.
31. Babak Arfaei, Program in Material Science, SUNY Bing amton, 2010; Committee C air; Advisor: E. J. Cotts.
32. Dylan Farnum, Department of Mec anical Engineering, SUNY Bing amton, 2010; Advisor: B. Sammakia.
33. Travis Fullem, Program in Material Science, SUNY Bing amton, 2008, Committee C air; Advisor: E. J. Cotts.
34. Saurab K. S rivastava, Department of Mec anical Engineering, SUNY Bing amton, 2008; Advisor: B. Sammakia.
35. Anand Desai, Department of Mec anical Engineering, SUNY Bing amton, 2007; Advisor: B. Sammakia.
36. Liang Yin, Department of Mec anical Engineering, SUNY Bing amton, 2005; Advisor: T. J. Singler.
37. P il Greenfield, Department of Mec anical Engineering, SUNY Bing amton, 2004; Advisor: G. L. Le mann.
38. Anis Zribi, Department of Mec anical Engineering, SUNY Bing amton, 2002, Committee C air; Advisor: E. J. Cotts.
39. Hao Tang, Department of Mec anical Engineering, SUNY Bing amton, 2001; Advisor: T. J. Singler.
40. Step an Mesc ter, Department of Mec anical Engineering, SUNY Bing amton, 2001; Advisor: T. J. Singler.
41. S un-Lien Wang, Department of P ysics, Carnegie-Mellon University, 1995; Advisor: R. F. Sekerka.
42. Jeffery S. Perkins, Department of Mec anical Engineering and Mec anics, Le ig University, 1991; Advisor: K. D. Step anoff.
43. Blaine K. Taylor, Department of Mec anical Engineering and Mec anics, Le ig University, 1990; Advisor: C. R. Smit .
44. C eng-Hsiung Kuo, Department of Mec anical Engineering and Mec anics, Le ig University, 1988; Advisor: D. O. Rockwell.

Current and Former Collaborators

Dr. M.R. Myers, CDRH/OSEL/DAM U.S. Food and Drug Administration, W ite Oak, Maryland.

Dr. T. Morrison, CDRH/OSEL/DAM U.S. Food and Drug Administration, W ite Oak, Maryland.

Prof. G. Ma ler, Department of Biomedical Engineering, SUNY Bing amton.

Prof. P.H. Huang, Department of Mec anical Engineering, SUNY Bing amton.

Prof. T.J. Singler, Department of Mec anical Engineering, SUNY Bing amton.

Dr. D. Homentcovsc i, Department of Mec anical Engineering, SUNY Bing amton and Department of Applied Mat ematics University Polite nica of Buc arest, Romania.

Prof. K. G ose, Department of Computer Science, SUNY Bing amton.

Prof. B. Sammakia, Department of Mec anical Engineering, SUNY Bing amton.

Prof. Y. Jos i, Sc ool of Mec anical Engineering, Georgia Institute of Tec nology.

Prof. A. Ortega, Department of Mec anical Engineering, Villanova University.

Prof. G.F. Carey, Department of Aerospace Engineering and Engineering Mec anics, University of Texas at Austin (Deceased).

Dr. S.R. Coriell, Metallurgy Division, National Institute of Standards and Tec nology, Gait ersburg, Maryland.

Dr. W.J. Boettinger, Metallurgy Division, National Institute of Standards and Tec - nology, Gait ersburg, Maryland (Retired).

Dr. G.B. McFadden, Mat ematical and Computational Sciences Division, National Institute of Standards and Tec nology, Gait ersburg, Maryland (Retired).

Prof. R.J. Braun, Department of Mat ematical Sciences, University of Delaware.

Prof. R.F. Sekerka, Department of P ysics, Carnegie-Mellon University (Emeritus).

Dr. A.A. C ernov, Materials Science and Tec nology Division, Lawrence Livermore National Laboratory.

Prof. C.F. C en, Department of Aerospace and Mec anical Engineering, University of Arizona (Deceased).

Prof. L.N. Brus , Department of Materials Science, University of Was ington.

Prof. D.M. Anderson, Department of Mat ematics, George Mason University.

Prof. J.A. Set ian, Department of Mat ematics, University of California, Berkeley.