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VINCENT P. MANNO

Work:
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Franklin W. Olin College of Engineering
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EDUCATION

Sc.D. (Nuclear Engineering) - Massachusetts Institute of Technology (1983)
Nuclear Engineer- Massachusetts Institute of Technology (1979)
M.S. (Nuclear Engineering) - Massachusetts Institute of Technology (1978)
B.S. (Nuclear Engineering Science) - Columbia University (1976)

EMPLOYMENT

Academic:

Franklin W. Olin College of Engineering
- Provost and Dean of Faculty (2011-present)
- Professor of Engineering (2011-present)

Tufts University
- Adjunct Professor of Mechanical Engineering (2011-present)
- Associate Provost (2004-2011)
- Dean *ad interim*, School of Engineering (2003)
- Associate Dean of Engineering (2002-2006)
- Department Chair (1993-2002)
- Professor of Mechanical Engineering (1999-2011)
- Associate Professor of Mechanical Engineering (1990-1999)
- Assistant Professor of Mechanical Engineering (1984-1990)

Massachusetts Institute of Technology
- Research Affiliate (1988-1993)
- Visiting Assistant Professor of Nuclear Engineering (part-time) (1984-1987)
- Postdoctoral Associate (1983)

Industrial & Other Appointments:

1. U.S. Navy Senior Summer Faculty Fellow - Naval Underwater Systems Center (1988)
2. Engineer (part-time) - Controls Group, Stone & Webster Engineering Corp. (1983-84)
3. Engineer - American Electric Power Corp. (1978-1981)

Consulting:
Altran Corp., C. S. Draper Laboratory, Condenser and MSR Consultants, Inc., Electric Power Research Institute, EPM, Inc., Ford Motor Co., NETGroup, Norton Company, Ontario Hydro, Panametrics, Inc., Thermal Form and Function, University Research Engineers & Associates.

HONORS AND PROFESSIONAL ACTIVITIES

Tau Beta Pi Engineering Honor Society (1975)
American Nuclear Society Award for Outstanding Senior (1976)
Alpha Nu Sigma Nuclear Engineering Honor Society (1978)
U.S. Department of Energy Fellowship (1982)
Ralph R. Teetor Educational Award, Society of Automotive Engineers (1986)
ASME Membership Development Achievement Award (1988)
Guest Editor, ***IEEE Transactions on Components and Packaging Technology*** (1994-2002)
Review Committee, Nuclear Engineering Division at Argonne National Laboratory (1998-2001)
Tufts ASME Student Section Award of Excellence (2001)
Harvey Rosten Award for Excellence in the Physical Design of Electronics (2002)
2002 ASME Curriculum Innovation Award (2002)
Fellow, American Society of Mechanical Engineers (2004)
Tufts University Henry and Madeline Fischer Award for "Engineers Teacher of the Year" (2005)
Outside PhD Examiner, Visvesvaraya Technological University, Belgaum, India (2007)
Elected "Last Lecture" speaker for the Tufts Class of 2010 (2010)
Tufts University Seymour O. Simches Award for Distinguished Teaching and Advising (2011)

Listed in (various years):
American Men and Women of Science
Leading Scientists of the World - 2011
Men of Achievement
Who's Who in America
Who's Who in American Education
Who's Who in Science and Engineering
Who's Who in the East
Who's Who of Emerging Leaders in America

Memberships and Activities:
American Association for the Advancement of Science
American Society of Engineering Education
    Board of Directors, Engieering Research Council (2011-present)
American Society of Mechanical Engineers
    Nuclear Engineering Division Plant Systems Subcommittee (1984-86)
    Executive Committee, Boston Section (1987-1990), Co-chair (1989)
    Region I Operating Board - Secretary (1992-93)
    Region I ME Department Heads - Secretary (1995-97, 2000-01)
    Fellow (elected 2004)
Institute of Electrical and Electronic Engineers - Components and Packaging Technology
    Annual IEEE SEMI-THERM Symposium
        Program Chair (1995), General Chair (1996), Steering Committee (2002-2007)

Tufts University (Workshop Convener)
Annual Thermal Manufacturing Workshops (1997-2002)
"Challenges and Opportunities for the Medical Device Industry" (2004)
"The Genie Travels On: The Challenges of Emergent Nuclear States" (2011)

Reviewer (various years) for:
Addison-Wesley Publishing Company
AIAA Journal
American Nuclear Society: Thermal-Hydraulics Division
American Society of Engineering Education: Mechanical Engineering Division
American Society of Mechanical Engineers: Fluids Engineering Division, Heat Transfer Division, Electronics Packaging Division
Chemical Engineering Communications
Department of Energy
Electrochemical and Solid State Letters
Heat Transfer Engineering
IEEE Transactions on Components, Packaging and Manufacturing Technology
International Journal of Computational Fluid Dynamics
International Journal for Numerical Methods in Engineering
International Journal for Numerical Methods in Fluids
International Journal of Heat and Mass Transfer
International Journal of Thermal Sciences
International Network for Engineering Education and Research - INEER
Irwin Publishing Company
Italian Ministry for University Education and Research (MIUR)
Journal of Dynamic Systems, Measurement and Control
Journal of the Electrochemical Society
Journal of Electronics Packaging
Journal of Energy Engineering
Journal of Fluids Engineering
Journal of Heat Transfer
Macmillan Publishing Company
McGraw-Hill Publishing Company
Microelectronics Reliability
National Science Foundation
Naval Undersea Warfare Center, U.S. Navy
Nuclear Engineering and Design
Nuclear Safety
Scientific Journal International
Thin Solid Films
U.S. Civilian Research & Development Foundation

Patents:
Laminar Air Jet Cooling of Heat Producing Components (with J. Guarino) – Tufts University, assignee – U.S. Patent 6603658 – issued August 5, 2003
Shear Sensors and Uses Thereof (with D. Gauthier, A. Mueller, C. Rogers and R. White) – Tufts University assignee – Patent Application 61/042,132 filed April 3, 2008

TEACHING AND SERVICE AT F. W. OLIN COLLEGE OF ENGINEERING (2011 –present)

Teaching:

MTH 3150 – Numerical Methods and Scientific Computing

Service:

Babson College Graduate School Advisory Board (2011)
College Board Academic Asembly Delegate (2012—resent)
Commenement Committee, Chair (2011-present)
President's Cabinet (2011-present)

TEACHING AND SERVICE AT TUFTS UNIVERSITY (1984-2011)

Teaching:

EN 12ME – Power Production (course originator)
ES 8 – Fluid Mechanics
ME 1 – Introduction to Mechanical Engineering (2002 ASME Curriculum Innovation Award)
ME 11 – Applied Thermodynamics
ME 19 – Project Laboratory
ME 43 – Senior Design Projects
ME 65 – Applied Fluid Mechanics
ES 101 – Numerical Methods
ME 112 - Advanced Heat Transfer
ME 145 – Power Generation Systems (course originator)
ME 149 - Electronic System Thermal Analysis (course originator)
ME 149 - Computational Methods in Thermal Manufacturing (course originator)
ME 168 - Fluid Mechanics and Heat Transfer Seminar
ME 212 – Computational Thermal-Fluid Dynamics (course originator)

Service:

University-Wide
Academic Council (2003-2011)
Academic Strategy Forum (2004-2007)
Ad-hoc Computational Server Strategic Planning Group (1999-2001)
Ad-hoc Patent Review Committee (2004)
Graduate and Professional Student Admissions Recruitment Committee, Chair (2007-2011)
Strategic Planning Group (2000-2001)
Information Technology Council (1997-2003)
Institutional Lead – 2009 Team Boston DOE Solar Decathlon Project (2007-2009)
Library and Information Resources Accreditation Committee (2001-2002)
Provost's Council (2003-presesnt)
Provost's Executive Committee (2008-present)
Research and Graduate Programs Council, Co-chair (2005-present)
Review Committee for HED Africa-U.S. Higher Education Initiative Planning Grants (2009)
ROTC Task Force – Chair (1996-97)
Scholars at Risk Network, Institutional Representative (2008-2011)
University Council on Graduate Education, Convener (2004-2010)

Arts, Sciences & Engineering
Ad hoc Committee on Faculty Development (1999-2000)
Annual Fund Faculty Financial Aid Fund Advisory Board (1997-1998)
Arts, Sciences & Engineering Council (2002-2005)
Berger Family Technology Transfer Endowment Advisory Board (1997-2001)
Capital Campaign Steering Committee (1993-1998)
Center for Teaching Excellence Advisory Committee (1996-1999)
Center for Writing, Thinking and Speaking Steering Committee (1998-2000)
CENTA Director Search Committee (1997-98)
Committee on Campus Planning (1988-1989)
Committee on Computer Network Services (1989-1992)
Committee on Computer Usage and Facilities (1985-1988), (1996-2002), Co-chair (1996-2000)
Committee on Undergraduate Advising and Counseling (1989-1991)
Department Chairs Agenda Committee (1995-1996, 1999-2001)
Information Technology Management Team (1996-2002)
Search Advisory Committee, Graduate School of Arts & Sciences Dean (2006)

School of Engineering
Ad-hoc Committee for First Year Computer Course, Chair (1993)
Ad-hoc Committee on Lufkin Library (1994-1996)
Berger Chair Search Committee (1997-98)
Computational Coordinating Committee (1990-1991), Chair (1990-1991)
Engineering Graduate Studies Committee, Chair (2000-2005)
Ethics in Engineering Advisory Committee (1998)
Executive Committee (1993-2005), Chair (2003)
Graduate Engineering Working Group, Chair (1999-2000)
Long Range Planning Group (1993-1995)
Search Committee for Gordon Institute Director, Chair (2005-2007)

Department of Mechanical Engineering
BSME Program Director (2005)
Department Chair (1993-2001)
Computational Mechanics Studio Director (1988-1993), Co-director (2002-2005)
Curriculum Committee (1985-1993), Chair (1985-1989)
Faculty Search Committees – chaired several - (1987, 1989, 1990, 1993, 1994, 2000, 2003, 2005, 2007, 2009, 2010)
Faculty Advisor to ASME Student Section (1985-1988, 2009)

RESEARCH SUPPORT AND ACTIVITIES

Areas of Interest

- Computational and Experimental Investigation of Thermal-Fluid Phenomena
- Engineering of Power Generation Systems
- Engineering Curriculum Development

Research Support

Funding to Date – Approximately $2M with $0.4M indirect cost recovery. Amounts for some grants prior to 1995 are best estimates. (Only activities as PI or segregated direct costs as co-PI included.)

Advanced Nuclear Power Plant Simplification - Electric Power Research Institute – 1985-1987, $10,000

Reducing Numerical Diffusion In Computational Thermal-Fluid Dynamics - Tufts University Summer Research Fellowship – 1986, $3,000

Simplified Boiling Water Reactor - U.S. Department of Energy/General Electric Company - Tufts PI (with M.I.T) - 1986-1988, $10,674

Thermal Environmental Testing of Composites - Bolt, Berenak & Newman – 1987, $12,000

Simulation of Transient Stratification Dynamics in Enclosures - IBM Academic Systems Grant - 1987-1988, 1000 hours of IBM 3090 time plus unlimited technical support, no direct monetary funding

Numerical Prediction of Fluid Behavior - Shutterway Fluid Dynamics - U.S. Navy Summer Faculty Research Fellowship – 1988, $12,000

Assessment of the Existing Knowledge Base for the Formulation of Dynamic Circulating Fluidized Bed Combustor Performance Models - Electric Power Research Institute - 1988-1989, $20,000

Development of Integral Analysis Tools for Prediction of Thermal Conditions in Electronic Enclosures - AT&T Bell Laboratories – 1989-91, $25,000

Hydrodynamic Test Problem Simulation - Charles S. Draper Laboratory – 1989, $3,000

Development of Advanced Simulation Methods For Immersed Body Hydrodynamics - Charles S. Draper Laboratory, 1990 - $37,325

Residual Stress Computer Support - U.S. Department of Transportation - PI – 1990, $7,500

Development of CFD Methods for Fluid-Acoustic Simulation - Charles S. Draper Laboratory - 1991-3, $142,565

Computational Fluid Dynamics Techniques for Fluid-Acoustic Simulation - National Science Foundation/Pittsburgh Supercomputing Center - Grant CBT910018P – 1991-92 – Cray YMP Supercomputer Time and support plus approximately $3,000 in direct support

Integrated Computer Use in the Mechanical Engineering Curriculum – IBM – 1993-1994, several IBM PC's for research computing (list prices unknown)

Integration, Innovation and Information in the Mechanical Engineering Curriculum - Lufkin Memorial Fund – 1996-98, $225,000

Graduate Fellowship Support - C.S. Draper Laboratory – 1997-1998, $32,943

Tufts-Rensselaer Thermal Manufacturing Research-Curriculum Program - National Science Foundation - NSF Grant EEC 9700731 - 1997-2000, $369,732

Research Experiences for Undergraduates Supplemental Grants - National Science Foundation – 1998-1999, $33,600

FLOTHERM Software & Support Grant – Flomerics, Inc. - PI – 1999, $30,000 plus annual fee waver

Enhanced Cooling of Portable Computers Using Mixed Natural and Jet Impingement Convection – Raytheon Corp. – 1999-2000, $26,830

Lufkin 2000 – Lufkin Memorial Fund – 2000-2003, $200,000

CMP of Cabot Pads – Cabot Microelectronics – PI with C. Rogers - 2000-2001, $60,000

Vacuum Pump Air Ejector Simulation – Nash Engineering Corp. - PI with B. Abedian – 2000, $19,152

Characterization of Chemical Mechanical Planarization Processes – Cabot Microelectronics Corp., Intel Corporation through NSF/ERC for Environmentally Benign Semiconductor Manufacturing – PI with C. Rogers – 2000-2008, $675,000

CMP of Small-Scale Dies - Draper Lab Fellowship – 2006-8, $70,200

In-situ CMP Characterization – SRC/Sematech Center for Environmentally Benign Semiconductor Manufacturing – PI with R. White and C. Rogers – 2008-9, $64,600

In-Situ CMP Characterization with Patterned Substrates – Intel Corp. – PI with R. White – 2008-9, $64,521

Aspen Aerogel Characterization – U.S. DOE – lead PI for modeling – 2009-10, shared direct costs

Thermoelectric Module-Liquid Metal Substrate Assemblies for Reduced Power Precision Temperature Control – Peter and Denise Wittich Fund for Alternative Energy – PI with M. Hodes - 2010-11, $30,771

Theses Supervision as Primary Advisor:

Completed: 5 Ph.D.
38 M.S.
3 B.S.

Current: None

REFEREED TECHNICAL PUBLICATIONS
(Italic name implies student advisee)

Journals:

1. **V.P. Manno**, "The Effect of Low Pressurized Water Reactor Containment Pressure on Peak Cladding Temperature", ***Nuclear Technology***, 48(3), 1980, pp. 281-288.
2. **V.P. Manno**, M.W. Golay and K.Y. Huh, "Analytical Models of Hydrogen Transport in Reactor Containment Atmospheres", ***Nuclear Science and Engineering***, 87(4), 1984, pp. 349-360.
3. **V.P. Manno** and M.W. Golay, "Application of the LIMIT Code to the Analysis of Hydrogen Transport", ***Nuclear Technology***, 67(2), 1984, pp. 320-311.
4. **V.P. Manno** and M.W. Golay, "Containment Hydrogen Transport: A Survey of Analytical Models and Benchmark Experiments", ***Nuclear Safety***, 25(6), 1984, pp. 797-814.
5. K.Y. Huh, M.W. Golay and **V.P. Manno**, "A Method for Reduction of Numerical Diffusion in the Donor Cell Treatment of Convection", ***Journal of Computational Physics***, 63(1), 1986, pp. 201-221.
6. **V.P. Manno** and M.W. Golay, "Nuclear Power Plant Design Innovation Through Simplification", ***Nuclear Engineering and Design***, 85, 1985, pp. 315-325.
7. **V.P. Manno** and M.W. Golay, "Analytical Modelling of Post Accident Containment Atmospheric Stratification", ***Nuclear Technology***, 70, 1985, pp. 124-132.
8. *P. Brock* and **V.P. Manno**, "Industrial Cogeneration: Analysis of Energy Parks", ***Journal of Energy Engineering***, 113(2), 1987, pp. 61-77.
9. M.W. Golay, **V.P. Manno** and *C. Vlahoplus, Jr.*, "Non-Prescriptive Nuclear Reactor Regulation: The Example of Loss of Offsite Power", ***Nuclear Safety***, 29(1), 1988, pp. 6-20.
10. *A. Dehbi* and **V.P. Manno**, "A Note: A Model of Steam Injector Performance", ***Chemical Engineering Communications***, Vol. 95, 1990, pp. 107-119.
11. **V.P. Manno**, "A Simple Method For Reducing Numerical Integration Errors Near Singularities", ***Communications in Applied Numerical Methods***, 4, 1988, pp. 713-716.
12. P.H. Seong, **V.P. Manno** and M.W. Golay, "Application of a Power Plant Simplification Methodology: The Example of the Condensate Feedwater System", ***Nuclear Engineering and Design***, 110(1), 1988, pp. 33-46.
13. *C. Gnafakis* and **V.P. Manno**, "Transient Destratification in a Rectangular Enclosure", ***Journal of Heat Transfer***, 111(1), 1989, pp. 92-99.
14. *G. Ruocco* and **V.P. Manno**, "A Performance Model of Bubbling Fluidized Bed Hydrodynamics", ***Powder Technology***, 59(4), 1989, pp. 261-273.
15. M.W. Golay, P.H. Seong and **V.P. Manno**, "A Measure of the Difficulty of System Diagnosis and Its Relationship to Complexity", ***International Journal of General Systems***, 16(1), 1989, pp. 1-23.

16. K. Azar, *S.E. Develle* and **V.P. Manno**, "Sensitivity of Simulated Circuit Pack Thermal Performance to Geometric Arrangement Variation", ***IEEE Transactions on Components, Hybrids and Manufacturing Technology***, 12(4), 1989, pp. 732-740.
17. *G. Leisk*, **V.P. Manno** and K. Azar, "Effect of System Orientation and Cooling Mechanism on Component Thermal Impedances in an Electronic Enclosure", ***IEEE Transactions on Components, Hybrids and Manufacturing Technology***, Vol. 13, No. 4, 1990, pp. 967-974.
18. *S.H. Reitsma* and **V.P. Manno**, "An Annotated Bibliography of Fluidized Bed Combustion Modeling Information", ***Powder Technology***, Vol. 63, 1990, pp. 23-34. Also, abstracted in ***Applied Mechanics Reviews***, Abstract 1264, Vol. 44, No. 5, 1991, p J596.
19. **V.P. Manno** and K. Azar, "Thermal-Fluid Interactions Of Neighboring Components On Air-Cooled Circuit Boards", ***Journal of Electronic Packaging***, Vol. 113, 1991, pp. 374-381.
20. **V.P. Manno** and K. Azar, "Using a Thermal Simulation Model to Interpret Test Data", ***IEEE Transactions on Components, Hybrids and Manufacturing Technology,*** Vol. 15, No. 5, 1992, pp. 632-639.
21. **V.P. Manno**, *S.H. Reitsma* and T. F. Tureaud, "Developing Numerical Techniques For Solving Low Mach Number Fluid-Acoustic Problems", ***AIAA Journal***, Vol. 31, No. 11, 1993, pp. 1984-1991.
22. P.H. Seong, M.W. Golay and **V.P. Manno**, "Diagnostic Entropy: A Quantitative Measure of the Impact of Signal Incompleteness on System Diagnosis", ***Reliability Engineering and System Safety***, Vol. 45, 1994, pp. 235-248.
23. *J. Burgos*, **V.P. Manno** and K. Azar, "Achieving Accurate Thermal Characterization Using A CFD Code - A Case Study of Plastic Packages", ***IEEE Transactions on Components, Packaging and Manufacturing Technology - Part A***., Vol. 18, No. 4, 1995, pp. 732-738.
24. *S.H. Reitsma*, **V.P. Manno** and T.F. Tureaud, "Numerical Simulation of Receptivity Phenomena in Transitional Boundary Layer Flows", ***AIAA Journal***., Vol. 35, No. 5, 1997, pp. 789-795.
25. **V.P. Manno**, "Integrated Thermal Network Models Are Still Useful", ***Electronics Cooling***, Vol. 3, No. 3, 1997, pp. 28-31. (invited paper).
26. *A. Sbaibi* and **V.P. Manno**, "On the Accuracy of Upwind and Symmetric TVD Schemes in Simulating Low Mach Number Flow", ***International Journal of Computational Fluid Dynamics***, Vol. 13, 2000, pp. 125-142.
27. S.W. Coppen, **V.P. Manno** and C.B. Rogers, "Turbulence Characteristics Along the Path of a Heavy Particle", ***Computers & Fluids***, Vol. 30, 2001, pp. 257-270.
28. *J.R. Guarino* and **V.P. Manno**, "Laminar Jet Impingement Convective Heat Transfer in Partially Vented Enclosures Typical of Portable Computer Applications", ***IEEE Transactions on Components and Packaging Technology - Part A***, Vol. 25, No. 3, 2002, pp. 337-346.

29. J. Lu, C.B. Rogers, **V.P. Manno**, A. Philipossian, S. Anjur, and M. Moinpour, "Measurements of Slurry Film Thickness and Wafer Drag During CMP," ***Journal of the Electrochemical Society***, Vol. 151, Issue 4, 2004, pp. G241-G247.

30. *B. Ting* and **V.P. Manno**, "Transient Thermal-Mechanical Simulation of Laser Hammering in Optoelectronic Package Manufacturing", ***Journal of Electronic Packaging***, Vol. 127, No. 3, 2005, pp. 299-305.

31. *A. Scarfo*, **V.P. Manno**, C.B. Rogers, S. Anjur and M. Moinpour, "In-Situ Measurement of Pressure and Friction During CMP of Contoured Wafers", ***Journal of the Electrochemical Society***, Vol. 152, No. 6, 2005, pp. G477-G481.

32. C. Gray, D. Apone, C. Rogers, **V.P. Manno**, C. Barns, M. Mansour, S. Anjur and A. Philipossian, "Viewing Asperity Behavior Under the Wafer During Chemical Mechanical Polishing", ***Electrochemical and Solid State Letters***, Vol. 8, 2005, pp. G109-111.

33. C. Gray, R. White, **V.P. Manno** and C. B. Rogers, "Simulated Effects of Measurement Noise on Contact Measurements between Rough and Smooth Surfaces", ***Tribology Letters***, Vol. 29, No. 3, 2008, pp. 185-192.

34. *J. Vlahakis*, C. Rogers, **V.P. Manno**, R. White, M. Moinpour, D. Hooper, and S. Anjur, "Synchronous, In-situ Measurements in Chemical Mechanical Planarization", ***Journal of the Electrochemical Society***, 156(10), 2009, pp. H794-H802.

35. N. Mueller, C. Rogers, **V.P. Manno**, R. White, S. Anjur and M. Moinpour, "In-Situ Investigation of Slurry Flow Fields during CMP", ***Journal of the Electrochemical Society***, 156(12), 2009, pp. H908-H912.

36. *J. Vlahakis*, **V.P. Manno**, C. Rogers and R. White, "Stick-Slip Transitions in Chemical Mechanical Planarization", ***Electrochemical and Solid State Letters***, 13(6), 2010, pp. H206- H208.

37. C. Gray, C.B. Rogers, **V.P. Manno** and R. White, "Modeling of Dual Emission Laser Induced Fluorescence for Slurry Thickness Measurements in CMP", ***Experiments in Fluids***, 51(1), 2011, pp 281-293**.**

38. R.D. White, A.J. Mueller, M. Shin, D.Gauthier, **V.P. Manno** and C.B. Rogers, "Measurement of Microscale Shear Forces during Chemical Mechanical Planarization", ***Journal of the Electrochemical Society***, 158(10), 2011, pp. H1041-1051.

39. C. Melnick, M. Hodes, G. Ziskind, M. Cleary, **V.P. Manno**, "Reduced Power Temperature Control with Thermoelectric Module – Variable Conductance Heat Pipe Assemblies", ***IEEE Transactions on Components, Packaging and Manufacturing Technology***, Vol. 2, No. 3, 2012, pp. 474-482.

40. R. Zhang, M. Hodes, D.A. Brooks and **V.P. Manno**, "Optimized Thermoelectric Module-Heat Sink Assemblies for Precision Temperature Control", ***Journal of Electronic Packaging***, Vol 134 (2), 2012.

Refereed Conference Proceedings:

1. **V.P. Manno** and M.W. Golay, "Analytical Modelling of Post Accident Containment Atmospheric Stratification", Proceedings of the 3rd International Meeting on Nuclear Thermal Hydraulics, 1985, Paper No. 14A.
2. *B.K. Riggs*, M.W. Golay and **V.P. Manno**, "Droplet Condensation Heat Transfer in Nuclear Reactor Containment Sprays", Proceedings of the 3rd International Meeting on Nuclear Thermal Hydraulics, 1985, Paper No. 6D.
3. K.Y. Huh, M.W. Golay and **V.P. Manno**, "A Method for Reduction of Numerical Diffusion in the Donor Cell Treatment of Convection", Proceedings of the 23rd National Heat Transfer Conference, 1986.
4. *P. Brock* and **V.P. Manno**, "Industrial Cogeneration: Aspects of a New Approach", in Computer-Aided Engineering of Energy Systems, Vol. 2, R.A. Gaggioli, ed., ASME Publication AES 2-2, 1986, pp. 27-34.
5. **V.P. Manno** and *J.A. Haubold*, "A Finite Difference Convective Algorithm With Reduced Dispersion", in Numerical Methods in Thermal Problems, Vol. 5-2, R.W. Lewis et al., ed., Pineridge Press, 1987, pp. 1326-1337.
6. **V.P. Manno** and *R.E. Stakutis*, "Experimental Investigation of the Effect of Rib Spacing in an Asymmetrically Roughened Square Duct", Proceedings of the Third International Symposium on Laser Anemometry, A. Dybbs et al., ed., ASME Publication FED-Vol. 55, 1987, pp. 63-71.
7. M.W. Golay, P.H. Seong and **V.P. Manno**, "Design Simplification in Advanced Reactor Design", Proceedings of the 1988 Topical Meeting on the Safety of the Next Generation of Power Reactors, 1988.
8. *A. Dehbi* and **V.P. Manno**, "A Model of Steam Injector Performance", presented at the 1988 National Heat Transfer Conference, ANS Proceedings, HTC -Vol. 3, pp. 162-169.
9. K. Azar, *S.E. Develle* and **V.P. Manno**, "Sensitivity of Simulated Circuit Pack Thermal Performance to Geometric Arrangement Variation", presented at the 5th IEEE Semiconductor Thermal and Temperature Measurement Symposium - SEMITHERM V, 1989, pp. 112-120.
10. *G. Leisk*, K. Azar and **V.P. Manno**, "Effect of System Orientation and Cooling Mechanism on Component Thermal Impedances in an Electronic Enclosure", Proceedings of the 6th Annual IEEE Semiconductor Thermal and Temperature Measurement Symposium - SEMITHERM VI, 1990, pp. 17-24.
11. E.W. Hewitt, M.J. Horn and **V.P. Manno**, "Utilization of Jet Spreading Models in the Prediction of Local Condenser Conditions", Proceedings of the 2nd International Symposium in Condenser and Condensation, Bath, UK, 1990, pp. 257-267.
12. *J.R. Benson*, K. Azar and **V.P. Manno**, "Liquid Crystal Imaging for Temperature Measurement of Electronic Devices", Proceedings of the 7th Annual IEEE Semiconductor Temperature and Thermal Management Symposium, Phoenix, AZ, February 1991, pp. 23-33.

13. *S.H. Reitsma* and **V.P. Manno**, "A Fluid Dynamic Model Of A Circulating Fluidized Bed", Proceedings of the 11th International Conference On Fluidized Bed Combustion, Montreal, ASME, 1991, pp. 1431-1437.

14. K. Azar, *J.R. Benson* and **V.P. Manno**, "An Experimental Investigation of Microjet Impingement Heat Transfer", in Heat Transfer in Electronic Equipment - 1991, A, Ortega et al., eds., ASME HTD-Vol. 171, 1991, pp. 1-10.

15. **V.P. Manno** and K. Azar, "Using a Thermal Simulation Model to Interpret Test Data", Proceedings of the Eight Annual IEEE Semiconductor Temperature Measurement and Management Symposium, IEEE, Austin, TX, February 1992, pp. 4-10.

16. **V.P. Manno**, *N.R. Kurita* and K. Azar, "Experimental Characterization of Board Conduction Effects", Proceedings of the Ninth Annual IEEE Semiconductor Temperature Measurement and Management Symposium, IEEE, Austin, TX, February 1993, pp. 127-135.

17. *A. Sbaibi* and **V.P. Manno**, "New Performance Measures for Assessing Convective Algorithms: Application to 1-D Problems", in Quantification of Numerical Uncertainty in Computational Fluid Dynamics, I. Celik et al., eds., ASME FED-Vol. 158, ASME, 1993, pp. 77-88.

18. *A. Sbaibi* and **V.P. Manno**, "On the Origin of Some Bounded Oscillations in the Finite Volume Solution of the Navier-Stokes Equations", in Quantification of Numerical Uncertainty in Computational Fluid Dynamics, I. Celik et al., eds., ASME FED-Vol. 158, ASME, 1993, pp. 39-52.

19. *S.H. Reitsma*, **V.P. Manno** and T.F. Tureaud, "Non-Reflective Boundary Conditions For Fluid-Acoustic Simulations Using A Finite Volume Formulation", in Computational Aero- and Hydro-Acoustics - 1993, R. Mankbadi et al., eds., ASME FED-Vol. 147, ASME, 1993, pp. 71-82.

20. *S.H. Reitsma*, **V.P. Manno** and T.F. Tureaud, "Simulating Receptivity Phenomena In Transitional Boundary Layer Flows", in Unsteady Flows - 1994, T. Wei et. al., eds., ASME FED-Vol. 192, ASME, 1994, pp. 1-11.

21. *J. Burgos*, **V.P. Manno** and K. Azar, "Achieving Accurate Thermal Characterization Using A CFD Code: A Case Study of PLCC Packages", Proceedings of the Eleventh IEEE Semiconductor Thermal Measurement and Management Symposium, San Jose, CA, February 1995, pp. 55-64.

22. S.B. Ainley, S. Coppen, V.P. Manno and C.B. Rogers, "Modeling Particle Motion in a Turbulent Air Flow", accepted for presentation at the 1997 ASME Fluids Engineering Division Meeting, ASME-FED-SM97-3176, Vancouver, BC (Canada), June 1997.

23. *G. Ruocco* and **V.P. Manno**, "Natural Convection and Jet Impingement Enhancement in Electronic Cooling", presented at EUROTHERM - 1997: Thermal Management of Electronic Systems, Nantes, France, September 1997.

24. S.W. Coppen, **V.P. Manno** and C.B. Rogers, "Turbulence Statistics in the Particle-Lagrangian Reference Frame Using Direct Numerical Simulations", Proceedings of the Third International Conference on Multi-Phase Flow, Lyon, France, June 1998.

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