

# Curriculum Vitae

## JOHN M. SULLIVAN, JR.

Worcester Polytechnic Institute  
Mechanical Engineering Department  
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### Professional Interests:

Development and application of advanced numerical methods for visualization and solution of partial differential equations in engineering and biological sciences.

Current 3-year research interests:

- a.) Development of user interactive grid generation and deployment systems.
- b.) Development of graphics tools and strategies to facilitate nonlinear data interpretation in the field of biomedical engineering.
- c.) Development of three-dimensional tools for registration and segmentation of medical image data.

### Education:

Thayer School of Engineering, Dartmouth College, Hanover, NH 03755  
Doctor of Engineering, DE (6/86)  
University of Massachusetts, Amherst, MA 01003  
Master of Science in Mechanical Engineering, MSME (12/78)  
Bachelor of Science in Mechanical Engineering, BSME (6/77)  
Bachelor of Science Major - Zoology (12/73)

### Experience:

Worcester Polytechnic Institute, Mechanical Engineering Dept., 100 Institute Road,  
Worcester, MA 01609 - July 1987 to present.

### Capacity:

Professor of Mechanical Engineering (July 2000 - present)  
Professor of Biomedical Engineering (July 2000 – present)  
Professor of Computer Science (July 2003 - present)  
Professor of Electrical and Computer Engineering (July 2000 - present)  
Professor of Manufacturing Engineering (July 2000 - present)  
(Morgan-Worcester Distinguished Professorship, 1998 and 2004)  
Associate Professor of Mechanical Engineering (July 1991 – June 2000, tenured 5/93)  
Associate Professor of Electrical and Computer Engineering (Jan. 1997 – June 2000)  
Associate Professor of Manufacturing Engineering (July 1991 – June 2000)  
Assistant Professor of Mechanical Engineering (July 1987 - June 1991)  
Assistant Professor of Manufacturing Engineering (July 1990-June 1991)

Responsibilities:

Teaching: Undergraduate and graduate courses in numerical methods, engineering experimentation, transport phenomena, thermodynamics, design, and computer aided manufacturing systems.

Research: Finite element grid generation techniques for applied problems in medical and engineering sciences. Registration and segmentation algorithms to transform and align MRI and histological images. Numerical analysis of ground penetrating radar including decomposition of such signals via neural network strategies.

University of Vermont, Mechanical Engineering Dept, Burlington, VT 05405

September 1995 - December 1996

Capacity: Research Associate Professor (January '96 - December '96)

Adjunct Research Associate Professor (September '95 - December '95)

Responsibilities:

Teaching: Undergraduate courses such as: Introduction to Fluids: Advanced Fluids and Compressible Flow: and Engineering Experimentation Laboratory

Research: Examine the groundwater flow and chemical contaminant transport in soils experiencing seasonal frost penetration, rapid runoff/snowmelt conditions, and zones of discontinuous permafrost. Examine neural networks and other numerical strategies for decomposition of ground penetrating radar signals. Examine three dimensional mesh generation for anatomically accurate representations of human bodies and internal organs.

U.S. Army Cold Regions Research and Engineering Laboratory, 72 Lyme Road,

Hanover, NH 03755 - June 1994 to August 1995

Capacity: Sabbatical from WPI

Responsibilities: Examine the groundwater flow and chemical contaminant transport in soils experiencing seasonal frost penetration, rapid runoff/snowmelt conditions, and zones of discontinuous permafrost.

Consultant: July 1987 to June 1999

Thayer School of Engineering, Dartmouth College, Hanover, NH 03755

Finite element and boundary element software development and computer graphics.

U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH 03755

Thermal analysis of soils, economics of ground freezing for containment of hazardous waste, and automatic mesh generation

Thayer School of Engineering, Dartmouth College, Hanover, NH 03755 - 6/86 to 7/87.

Capacity: Research Assistant Professor of Engineering.

Responsibilities:

Teaching: Graduate course in numerical methods for partial differential equations.

Graduate course in computer-aided mechanical engineering design.  
Research: Development of numerical methods for dendritic morphology; moving boundary problems; heat and mass transfer with phase change. Numerical analysis of geophysical data. Finite element grid generation techniques for applied thermal problems in biomedical engineering.  
Other: Supervisor of Numerical Methods Laboratory.

Thayer School of Engineering, Dartmouth College, Hanover, NH 03755 - 9/81 to 6/86.

Capacity: Assistant in Research, Numerical Methods Laboratory.

Responsibilities: Numerical modeling of geophysical processes. Librarian and primary author of Numerical Methods Laboratory subroutine library.

Teaching assistant for graduate course in finite element and finite difference techniques.

Daniel R. Lynch, Advisor, Senior Investigator

Owens Corning Fiberglas, Technical Center, Granville, OH 43023 - 9/78 to 9/81.

Capacity: Advanced Engineer.

Responsibilities:

a.) Automation of Thermal Measurement Laboratory - Work entailed software development of computer control programs. Selection and purchase of automation equipment. Interface test equipment and room controls to computers. Establish backup systems and training of laboratory personnel.

b.) Thermal Performance of Insulated Pipe Systems - Work entailed project proposal definition including cost analysis, economic and technical justifications. Implementation of accepted proposal. Statistical analysis, numerical and physical modeling of pipe systems and presentation of work.

William Edmunds - Manager.

Materials Research Laboratory, University of Massachusetts, Amherst, MA 01003  
- 1/77 to 9/78.

Capacity: Assistant in Research - Materials Research Laboratory.

Responsibilities: Determine the mechanical reliability of optical glass fibers.

Teaching Assistant - undergraduate mechanical engineering laboratories.

Work Study - design Instron grips for polymer-coated glass fibers.

John E. Ritter, Jr., Senior Investigator.

Publications: (138)

Peer Reviewed Publications: (32)

- Ghadyani, H., Sullivan, J.M., Jr., and Wu, Z., "Boundary Recovery for Delaunay Tetrahedral Meshes using Local Topological Transformations", *Finite Elements in Analysis and Design*, Volume 46, pg 74 – 83, (2010).
- Murugavel, M. and J.M. Sullivan Jr., "Automatic cropping of MRI rat brain volumes using pulse coupled neural networks", *NeuroImage*, Volume 45, Issue 3, Pg 845-854, ISSN 1053-8119, (2009).
- J.Q. Zhang, J.M. Sullivan, Jr., H.A. Ghadyani, and D.M. Meyer, "MRI guided 3D mesh generation and registration for biological modeling", *JCISE*, V5, N4, p283-290, (2005).
- Z. Wu, K.D. Paulsen, and J.M. Sullivan, Jr., "Adaptive Model Initialization and Deformation for Automatic Segmentation of T1-weighted Brain MRI Data" *IEEE Trans. Biomed. Eng.*, V52, No 6, p1128-1131, (2005)
- C.F. Ferris, P Kulkarni, J.M. Sullivan Jr, J.A. Harder, T.L. Messenger, and M. Febo, "Pup Suckling Is More Rewarding Than Cocaine: Evidence from Functional Magnetic Resonance Imaging and Three-Dimensional Computational Analysis", *J NeuroScience*, V25, N1, (2005)
- C.F. Ferris, C.T. Snowdon, J.A. King, J.M. Sullivan, Jr., T.E. Ziegler, D.P. Olson, N.J. Schultz-Darken, P.L. Tannenbaum, R. Ludwig, Z. Wu, A. Einspanier, J.T. Vaughan, T.Q. Duong , "Activation of neural pathways associated with sexual arousal in non-human primates", *JMRI*, N10456, p168-175, (2004).
- Wu, Z. and J.M. Sullivan, Jr., "Multiple material marching cubes algorithm", *IJNME*, V58, pg 189-207, (2003).
- Sullivan, J.M., Jr. and Zhang, Y., "Integrated Surface and Ground Water Modeling for Contaminant Fate and Transport Predictions", *J. of Hydro. Sci. and Tech.*, V17, N1-4, 341- 350, 2001.
- Moussa, J., L.R. Ram-Mohan, J. Sullivan, T. Zhou, D.R. Hines, and S.A. Solin, "Finite element modeling of enhanced magnetoresistance in thin film semiconductors with metallic inclusions", *Physical Review B*, V64, N184410, October (2001).
- Ferris, C.F., C.T. Snowdon, J.A. King; T.Q. Duong; T.E. Ziegler, K Ugurbil, R Ludwig, N.J. Schultz-Darken, Z Wu, D.P. Olson, J.M. Sullivan, Jr, P.L. Tannenbaum, J.T. Vaughan, "Functional imaging of brain activity in conscious monkeys responding to sexually arousing cues", *NeuroReport*, V12, 2231-2236, July (2001).
- Sullivan, J.M., Jr. and R. Ludwig, "A coupled neural network and consecutive layer identification system for stratigraphic layer identification", *J. of AIH*, V15, No 1, 1-10, 2000.
- Sullivan, J.M., Jr., R. Ludwig, and D.V. Repin, "Permafrost and stratigraphic layer identification using a hierarchical neural network for interpretation of ground penetrating radar, in *Models for cold regions contaminant hydrology: Current uses and future needs.*, Eds: S.A. Grant and I.K. Iskandar, Ann Arbor Press, Ch. 9., 2000.

- Saxena, R., T.S. Keller, and J.M. Sullivan, Jr., "A three-dimensional finite element scheme to investigate apparent mechanical properties of trabecular bone", *Computer Methods in Biomechanics and Biomedical Engineering*, 2, No. 2, 285-294, 1999.
- Sullivan, J.M., Jr., and Q.Y. Zhang, "Adaptive Mesh Generation Using a Normal Offsetting Technique", *Finite Elements in Analysis and Design*, 25, No.2, pgs. 275-295, (1997).
- Sullivan, J.M., Jr., G. Charron, and K.D. Paulsen, "A Three Dimensional Mesh Generator for Arbitrary, Multiple Material Domains", *Finite Elements in Analysis and Design*, 25, No. 2, pgs. 219-241, (1997).
- Sullivan, Jr., J.M. and H. Hao, "Numerical predictions of anisotropic effects on side branch development versus tip-splitting during solidification", in *Thermal Transport in Solidification Processing*, HTD, Vol 323, ASME press, pp 263-274, (1996).
- Paulsen, K.D., P.M. Meaney, M.J. Moskowitz, and J.M. Sullivan, Jr., "A dual mesh scheme for finite element based reconstruction algorithms", *IEEE Trans. on Medical Imaging*, 14, No 3, (1995).
- Gupta, A., J.M. Sullivan, Jr., and H.E. Delgado, "An efficient BEM solution for three-dimensional transient heat conduction", *Int. J. Num. Meth. in Heat and Fluid Flow*, 5, pp 327-340, (1995).
- Paulsen, K.D., Xilin Jia, and J.M. Sullivan, Jr., "Finite element computations of specific absorption rates in anatomically-conforming full-body models for hyperthermia treatment analysis", *IEEE Trans. on Biomed. Eng.*, 40, No.9, pp 933-945, (1993).
- Sullivan, J.M.Jr. and H. Hao, "Comparison of simulated dendritic tip characteristics to those experimentally observed in unconfined environments", in *Heat transfer in melting, solidification, and crystal growth*, HTD, Vol 234, ASME press, pp 13-20, ISBN 0-7918-1147-6, (1993)
- Johnston, B.P. and J.M. Sullivan, Jr., "A normal offsetting technique for the fully automatic generation of meshes in three dimensions", *Int. J. Num. Meth. in Engg.*, 36, pp 1717-1734, (1993).
- Gupta, A., H.E. Delgado, and J.M. Sullivan, Jr., "A 3-dimensional BEM solution for plasticity using regression interpolation within the plastic field", *Int. J. Num. Meth. in Engg.*, 33, pp 1997-2014, (1992).
- Sullivan, J.M., Jr. and K. O'Neill, "Application of infinite elements to phase-change situations on deforming meshes.", *Int. J. Num. Meth. in Engg.*, 33, pp 1861-1874, (1992).
- Johnston, B.P. and J.M. Sullivan, Jr., "Fully automatic 2-dimensional mesh generation using normal offsetting.", *Int. J. Num. Meth. in Engg.*, 33, pp 425-442, (1992).
- Johnston, B.P., J.M. Sullivan, Jr., and A. Kwasnik, "Automatic conversion of triangular finite element meshes to quadrilateral elements.", *Int. J. Num. Meth. in Engg.*, 31, pp67-84, (1991).
- Sullivan, J.M., Jr., and D.R. Lynch, "Non-linear simulation of dendritic solidification of an undercooled melt.", *Int. J. Num. Meth. in Engg.*, 25, p 415-444, (1988).

- Officer, C.B., W. Newman, J.M. Sullivan, Jr., and D.R. Lynch, "Glacial isostatic adjustment and mantle viscosity.", *J. of Geophysical Research*, 93, No. B6, 6397-6409, (1988).
- Sullivan, J.M., Jr., D.R. Lynch, and K. O'Neill, "Finite-element simulation of planar instabilities during solidification of an undercooled melt.", *J. Comp. Phys.*, 69, 81-111, (1987).
- Lynch, D.R. and J.M. Sullivan, Jr., "Discussion - Comparison of boundary and finite element methods for moving boundary problems governed by a potential.", *Int. J. Num. Meth. in Engg.*, 23, 349-350 (1986).
- Lynch, D.R. and J.M. Sullivan, Jr., "Heat conservation in deforming element phase change simulation.", *J. Comp. Phys.*, V 57, N 2, 303-317, (1985).
- Ritter, J.E., Jr., K. Jakus, and J.M. Sullivan, Jr., "Dependency of fatigue predictions on the form of the crack velocity equation.", *J. Am. Ceram. Soc.*, V 64, N 6, (1981).
- Ritter, J.E., Jr., J.M. Sullivan, Jr., and K. Jakus, "Application of fracture-mechanics theory to fatigue failure of optical glass fibers.", *J. Appl. Phys.*, V 49, N 9, 4779-82, (1978).

Conference Proceedings: (78)

- M. Murugavel and J. M. Sullivan, Jr., "Automatic brain cropping enhancement using active contours initialized by a PCNN", *Proc. SPIE 7259, 72594I* (2009)
- W. Huang, J.M. Sullivan, Jr., H. Ghadyani, and M. Murugavel, "Automatic Image Registration Based Upon an Elastic Finite Element Formulation", *Proc. 15th Intl. Soc. Mag. Reson. Med.*, No 3699, Berlin, Germany, (2007)
- M. Murugavel, S. Tadanki, J. M. Sullivan, Jr., and G. Bogdanov, "A Segmentation Methodology that Accounts for the MR Physics of the RF Pulse Sequence", *Proc. 15th Intl. Soc. Mag. Reson. Med.*, No 3708, Berlin, Germany, (2007)
- M. M. Swathanthira-Kumar and J. M. Sullivan, Jr., "Automatic brain cropping and atlas slice matching using a PCNN and generalized invariant Hough transform process", *SPIE, Medical Imaging*, No 6512-24, San Diego, CA, (2007)
- H. R. Ghadyani and J. M. Sullivan, Jr., "Quality improvement of tetrahedral meshes by optimizing the minimum local angle", *SPIE, Medical Imaging*, No 6509-91, San Diego, CA, (2007)
- W. Huang, J.M. Sullivan, Jr., P. Kulkarni, and M. Murugavel, "Automatic 3D image registration using voxel similarity measurements based on a genetic algorithm", *SPIE, Medical Imaging*, No 6144-106, San Diego, CA, (2006)
- W. Huang and J.M. Sullivan, Jr., "An Automated Image Registration Methodology Using a Hybrid Genetic Algorithm Strategy", *Proc. 14th Intl. Soc. Mag. Reson. Med.*, No 3359, Seattle, WA, (2006)
- Z. Li, W. Chen, P. Kulkarni, K. Murphy, J. Sullivan, J.A. King, "Imaging nicotine response in an animal model of ADHD", *Soc. Neurosci.* 480.14, (2006)
- M. Murugavel, J.M. Sullivan, and K.G. Helmer, "Comparison of the Signal-To-Noise Sensitivity of Different False Discovery Rate Methods", *Proc. 14th Intl. Soc. Mag. Reson. Med.*, No 2864, Seattle, WA, (2006)

- J.Q. Zhang, J.M. Sullivan, Jr., Z. Wu, W. Huang and S.N. Kinkar, "A framework for multi-modality imaging registration and visualization", Proc. 8th US Nat. Congress Comp Mechanics, (2005).
- J.Q. Zhang, J.M. Sullivan, Jr., Z. Wu, U.A. Benz, "MR Image Guided Composite Imaging Data Visualization", Proc. 13th Intl. Soc. Mag. Reson. Med., No 1872, Miami, FL, (2005)
- M. Murugavel, J.M. Sullivan, Jr., P.K. Kulkarni, "An Integrated Volume Approach Enhances the Accuracy of Functional Voxel Classifications", Proc. 13th Intl. Soc. Mag. Reson. Med., No 1565, Miami, FL, (2005)
- H. Yu, J.M. Sullivan, Jr., H. R. Ghadyani, J. Q. Zhang, "Image Registration by Global Maximization of Mutual Information Based on a Genetic Algorithm", Proc. 13th Intl. Soc. Mag. Reson. Med., No 1567, Miami, FL, (2005)
- W. Chen, J.A. King, C.F. Ferris, P. Kulkarni, J.M. Sullivan, "Odor-Induced Functional Imaging of Brain Activity in Conscious Animals", Proc. 13th Intl. Soc. Mag. Reson. Med., No 1397, Miami, FL, (2005)
- J.Q. Zhang and J.M. Sullivan, Jr., "Image Guided Multi-Modality Registration and Visualization for Breast Cancer Detection", SPIE, Medical Imaging, No 5744-14, San Diego, CA, (2005).
- J.M. Sullivan, Jr., J.S. Mullen, and U. Benz, "Remote control of a functional MRI study via tele-collaboration tools.", SPIE, Medical Imaging, No 5748-69, San Diego, CA, (2005).
- Z. Wu, S.N. Kinkar, J.M. Sullivan, Jr., J.Q. Zhang, U. Benz, "Segmentation of Breast MR Images via ITK Routines", Proc. 12<sup>th</sup> Intl. Soc. Mag. Reson. Med., No. 2602, (2004).
- J.Q. Zhang, J.M. Sullivan, Jr., H.R. Ghadyani, U. Benz, Z. Wu, D.M. Meyer, "MR Image Guided 3D Registration and Mesh Generation for Brain Vasculature Model", Proc. 12<sup>th</sup> Intl. Soc. Mag. Reson. Med., No. 2244, (2004).
- H.R. Ghadyani, J.M. Sullivan, Jr., Y. Zhang, P.P. Kulkarni, J.Q. Zhang, "A Segmented Numerically Robust 3D Atlas of a Mouse Brain", Proc. 12<sup>th</sup> Intl. Soc. Mag. Reson. Med., No. 2234, (2004).
- W. Huang, J.M. Sullivan, Jr., R. Ludwig, P. Kulkarni, J.Q. Zhang, J.A. King, "Stair-Stepped Removal via Automatic Linearization for Marching Cubes Formulations", Proc. 12<sup>th</sup> Intl. Soc. Mag. Reson. Med., No. 756, (2004).
- R. Ludwig, J. Sullivan, T. Fisher, and G. Bogdanov, "A Multi-Transmission Line Model to Simulate High-Field Magnetic Resonance Coils", Prog in EM Res Symp, No. 0303101335, PIERS2003, (2003).
- J.Q. Zhang, J.M. Sullivan, Jr., and Z. Wu, "Coupled 3D mesh generation and registration for the human brain", Proc. 7th US Nat. Congress Comp Mechanics, (2003).
- J.M. Sullivan, Jr., W. Huang, J.Q. Zhang, and Z. Wu, "Automatic linearization during multiple-material surface mesh generation", Proc. 7th US Nat. Congress Comp Mechanics, (2003).
- U. Benz, J.M. Sullivan, Jr., M. Lu, M. Febo, and C. Ferris, "MRI Database Development and Visualization for Translational Science Studies", Proc. 11<sup>th</sup> Intl. Soc. Mag. Reson. Med., No. 4547, (2003).

- J.Q. Zhang, J.M. Sullivan, Jr., P.P. Kulkarni, M. Brevard, U. Benz, and H.L. Yu, "Intermodality Registration via Interactive Graphics Coupled with A.I.R. Intramodality Registration", Proc. 11<sup>th</sup> Intl. Soc. Mag. Reson. Med., No. 3430, (2003).
- P.P. Kulkarni, J.M. Sullivan, Jr., H.R. Ghadyani, W. Huang, Z. Wu, and J.A. King, "Automatic Segmentation of a Rat Brain Atlas via a Multiple-Material, Marching-Cube Strategy", Proc. 11<sup>th</sup> Intl. Soc. Mag. Reson. Med., No. 4512, (2003).
- R. Lemdiasov, R. Ludwig, K. Helmer, J.M. Sullivan, and C.F. Ferris, "Design of a Uni-planar Gy Surface Gradient Coil", Proc. 11<sup>th</sup> Intl. Soc. Mag. Reson. Med., No. 2574, (2003).
- C.F. Ferris, C. Snowdon, J.A. King, J.M. Sullivan, Jr., D.P. Olson, T. Zeigler, N. Shultz-Darken, P. Tannenbaum, R. Ludwig, and T. Duong, "Functional Magnetic Resonance Imaging in Conscious Marmoset Monkeys: Methods and Applications in Neuroscience Research", 7<sup>th</sup> Workshop of the EMRG, Paris, 14<sup>th</sup>-16<sup>th</sup> October 2002.
- Z. Wu, J.M. Sullivan, Jr., and K.D. Paulsen, "A Normal-Offsetting Node Deployment Strategy for High Quality Equilateral Triangular Elements", Proc. 8th Int. Conf. Grid Gen., ISGG Press, ISBN: 0-9651627-4-5, pp 671-680, (2002).
- R. Ludwig, G. Bogdanov, J.M. Sullivan, Jr., J. King, and C. Ferris, "Actively-Tuned Dual RF Resonator System for Functional MRI of Small Animals", Proc. 10th Intl. Soc. Mag. Reson. Med, No. 870, (2002).
- J.A. King, C.F. Ferris, T.Q. Duong, R Ludwig, J.M. Sullivan, Jr., M. Does, "Functional Imaging of Brain Activity in Conscious Animals: The Smell of Fear" Proc. 10th Intl. Soc. Mag. Reson. Med, No. 1352, (2002).
- R. Ludwig, G. Bogdanov, J.M. Sullivan, Jr., C. Ferris and J. King, "High-field functional MRI of small animals by a dual RF-coil system", presented HiRes Imaging in Small Animals, (9/2001)
- C.F. Ferris, C.T. Snowdon, J.A. King, T.Q. Duong, T.E. Ziegler, D.P. Olson, R Ludwig, N Schultz-Darken, Z Wu, P Tannenbaum, J.M. Sullivan, Jr., S-G Kim, J.T. Vaughan, Jr., "Brain Activity in Fully Conscious Monkeys in Response to Sexual Cues", presented NIH HiRes Imaging in Small Animals, (9/2001)
- R. Ludwig, G. Bogdanov, J.M. Sullivan, Jr., J.A. King and C. Ferris, "A coupled microstrip line TEM resonator model for high-field magnetic resonance imaging", presented HiRes Imaging in Small Animals, (9/2001)
- C. Snowdon, C. Ferris, J. King, T. Duong, T. Ziegler, P. Tannenbaum, N. Schultz-Darken, D. Olsen, R. Ludwig, Z. Wu, J. Sullivan, J. Vaughn, "The Scent of a Female: Imaging Neural Responses to Sexual Stimuli", presented at 2001 annual Animal Behavior Society conference, July 14-18,'01, Oregon.
- Wu, Z, and Sullivan, J.M., Jr., "Efficient multi-material surface mesh generation", presented 6th US Nat. Congress Comp Mechanics, pg 306, (8/2001).
- Y. Zhang and J.M. Sullivan, Jr., "A neural network system for predicting ground-water elevations at user-specified sites based on regional surface-water data", in Integrated Surface and Ground Water Management, Ed. B.K. Panigrahi, ASCE press, ISBN: 0-7844-052-X, pp 63-72, (2001)



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- Sullivan, J.M., Jr. and Zhang, Y., "Integrated Surface and Ground Water Modeling for Contaminant Fate and Transport Predictions", presented AIH 2000 conference, November 5-8, 2000.
- Sullivan, J.M., Jr., Wu, Z., and Kulkarni, A., "Three-dimensional, finite-element mesh generation of anatomically accurate organs using surface geometries created from the Visible Human data set", 3rd Visible Human Project Conf. 10/5-6/00, ISSN 1524-9008, <http://www.nlm.nih.gov/research/visible/vhpconf2000/MAIN.HTM>
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- J.Q. Zhang and J.M. Sullivan, Jr., "Three dimensional mesh generation using a deltahedral building block for anatomically accurate biological models", presented: 5th US Nat. Congress Comp Mechanics 1999, Aug. 1999.
- J.M. Sullivan, Jr. and I.K. Iskandar, "Three dimensional groundwater flow and contaminant transport modeling at ST48: Power plant fuel spills, Eielson AFB, in 1999 Military programs joint environmental, engineering, and construction conference, U.S. Army Corps of Engineers, March 1999.
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- Sullivan, J.M.Jr., P.M. Currier, and I.K. Iskandar, "Effects of discontinuous permafrost on groundwater flow and contaminant transport", 91st Annual Cordilleran Section GSA conference, GSA abstracts with programs, V27, N5, p-80, ISSN 0016-7592, (5/1995).
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- J. D. Lilley, J.M. Sullivan, Jr., and R. R. Biederman, "Heat transfer in a plasma arc melting process", Proc. Electron Beam Melting and Refining State of the Art 1991, Ed. R. Bakish, pp 270-283, (1992).
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- Sullivan, J.M., Jr. and D.H. Fu, "Cadkey in Research", in Mastering CADKEY by A. Torizzo and G. Garguilo, Macmillan/McGraw-Hill, Version 5, 1993
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- Sullivan, J.M. Jr., P.M. Currier, and I.K. Iskandar, "Groundwater flow for contaminant transport analyses in cold regions", presented at Tri-Services Environ. Tech. Workshop, Hershey, PA, May 1996.
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- B. Berka, R. Inderbitzen, R. Diaz, and J.M. Sullivan, Jr., "The voice of space", presented at Nat. Sci. Teach. Assoc. Nat. Conv., Boston, MA, March 26-29, 1992.
- Alexandrou, A. N. and J. M. Sullivan, Jr., "Stability analysis of a phase change interface using an inverse isothermal finite element method", Presented at 42nd Annual meeting Applied Physics Soc., Division of Fluid Mech., Palo Alto, CA, November, (1989).
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- Sullivan, J. M., Jr. and J. J. DiPietro, "Kinematic and Dynamic Applications of Computer Aided Design Graphics", presented at the ASEE New England section 66th Annual Fall Conference at Univ. of Hartford, W. Hartford, CT, October, (1988).
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Proposals, Grants and Awards: ( \$6,299,780)

Previous awards: (\$5,238,356)

National Science Foundation award for 20 hours of Supercomputer time on the CYBER-205 system at Colorado State University, 10-85 through 10-86.

National Science Foundation award for 20 hours of Supercomputer time at John Von Neumann Center, Princeton, NJ, NSF-70005, 10-86 through 10-87.

"Preliminary study of ground freezing as a means of hazardous waste containment", WPI Research Development Council grant #429860, 12-87 through 11-88, \$4,487.

"Interactive three-dimensional stress analysis cube", WPI Educational Development Council grant #429714, 1-88 through 12-88, \$3,000.

- "Numerical Solution of Hazardous Waste Containment and Consolidation via Artificial Ground Freezing", NSF Research Initiation, CBT-8808477, 6/1/88 - 11/30/90, Funding \$ 60,000.
- "Parametric Modeling: A CADKEY Enhancement", CADKEY Inc. Manchester, CT 06040-2100, 1/1/90 - 6/30/91, Funding level: \$ 43,000.
- "Ultrasound NDE of Adhesive Bond Integrity - Phase I", Co-PI with R Ludwig of Worcester Polytechnic Institute, One year effort, BAA (DAAL04-90-C-0024), Funding level: Phase I - \$ 82,290; 9-1990 to 8-1991, Dept. of the ARMY, U. S. Army Laboratory Command, MTL, Watertown, MA 02172-0001
- "Computerized Thermal Dosimetry for Hyperthermia", Subcontract through Dartmouth College - NIH Grant # 5 R01 CA37245-08, WPI Award #530240, 5/1/91 - 4/30/92, Funding level: \$ 10,000.
- "Ultrasound NDE of Adhesive Bond Integrity - Phase II", Co-Investigator with Reinhold Ludwig of Worcester Polytechnic Institute, One year effort, Broad Agency Announcement (DAAL04-90); Funding level: \$ 81,680. 8/91-7/92, Director, Materials Technology Laboratory, SLCMT-TP, Dept. of the ARMY, U. S. Army Laboratory Command Materials Technology Laboratory, Watertown, MA 02172-0001
- "Unfolding 3-D CAD Geometries to 2-D Pattern Layouts: A CADKEY Enhancement", with Co-Investigator R. L. Norton of WPI, CADKEY Inc. Manchester, CT 06040-2100, 1/1/90 - 12/31/92, Funding level: \$ 137,971.
- "Enhancement Strategies for CADKEY's Numerical Analysis Interface and Solver Routines", CADKEY inc., Windsor, CT 06095, 6/1/93 - 5/31/94, Funding Level \$36,000.
- "The Design Center: An Integrated Design Visualization to Product Realization Facility", with J. Strauss, D. Rodino, and D. Walcerz, W.M. Keck Foundation, Los Angeles, CA. A laboratory and building construction grant for the mechanical engineering department at WPI, June 1994, Funding Level \$425,000.
- "Integration of 2D automatic mesh generation for simulation of contaminants in soils and groundwater", Broad Agency Announcement (DACA89-94-M-0754), U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH. 2/4/94 - 5/30/94, Funding Level \$ 23,800.
- "Groundwater flow and contaminant transport analyses in areas of CERCLA concern on Fort Wainwright, Alaska", with Co-Investigators P.M. Currier, and B.D. Taras, U.S. Army Corps of Engineers, Alaska District, Anchorage, AK 99506-0898, 11/1/94 - 10/31/95, Funding Level \$241,395.
- "Automatic finite element mesh generation for computerized thermal dosimetry for hyperthermia", NIH subcontract with Dartmouth College, Hanover, NH. 1/95 -12/1995, Funding Level: \$ 42,748.
- "Integration of 3D Automatic Mesh Generation for Simulation of Contaminants in Soils and Groundwater", BAA Announcements, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH. DACA89-95-K-0001, 3/95-9/95, Funding Level: \$ 24,900.

- "Numerical modeling of groundwater flow and contaminant fate and transport with application to cold regions", Broad Agency Announcement, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH., US DACA89-95-K-0023, UVM Ref # EM-96-03-050, 9/18/95-12/31/96, Funding Level \$ 99,991.
- "Neural network modeling to delineate subsurface stratigraphy", Broad Agency Announcement, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH., US DACA89-96-K-0006, UVM Ref # EM-96-05-61, 7/10/96 - 12/31/96, Funding Level 137,130.
- "Numerical mesh generation in support of computer aided analysis of electromagnetically induced hyperthermia", NIH subcontract with Dartmouth College, Hanover, NH., 5-31827 R01 CA37245-10, UVM Ref # EM-96-02-042, 1/96 -12/1996, Funding Level: \$ 60,215.
- "FIDOE: Fully Independent Delivery of Expendables; An Autonomous Robot Prototype", with Co-Investigator E. Cobb, Funding Agency: Hamilton Standard, WPI Fund: 233020, Org: 244020, 6/97 - 5/98, Funding Level: \$20,000.
- WPI Morgan Distinctive Instructorship: ME Faculty Advisor of Year Award 1997/98.
- "Application of a neural network model coupled with genetic algorithms to optimize soil cleanup of subsurface contamination", Strategic Environmental Research and Development Program (SERDP), Arlington, VA, grant to USA CRREL, 1/96 - 12/98, Funding Level \$ 641,000.
- "Numerical mesh generation in support of computer aided analysis of electromagnetically-induced hyperthermia", NIH subcontract with Dartmouth College, Hanover, NH., 5-31827 R01 CA37245-10, 1/98 -12/99, Funding Level: \$ 111,574.
- "A preliminary investigation into the use of finite element analyses for nonlinear component fixturing.", Compaq Computer Corp., AlphaServer Prod. Dev., RC-385501, 09/99-12/99, Funding Level \$ 10,722.
- "Development of a Graphical User Interface for Medical Imaging of Brain Tissues.", Department of Psychiatry, University of Massachusetts Medical Center, Worcester, MA, 01/00 - 5/00, Funding Level: \$ 11,898.
- "Functional MRI of Sexual Motivation in Nonhuman Primates", UMASS Medical School, 6/1/00 – 1/31/01, Funding Level: \$ 29,538.
- "Delineation of discontinuous permafrost regions for groundwater flow and contaminant transport modeling in cold regions", Broad Agency Announcement, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH., 01/01/97 - 12/31/00, SFRC No. DACA89-97-K-0001, Project No. CRRLGC-6361-5229, Funding Level \$ 541,876.
- "Functional MRI of Sexual Motivation in Nonhuman Primates", UMASS Medical School, 2/1/01 – 1/31/02, Funding Level: \$41,071.
- "Noninvasive Devices for fMRI Studies in Cocaine Abuse", Co-PI with R. Ludwig, Insight Neuroimaging Systems, NIH-STTR, 3/29/01 - 3/28/02, Funding Level \$ 55,055.



"Adaptive Dual Mesh Strategy Development in Support of Alternative Breast Cancer Imaging Modalities", NIH subcontract with Dartmouth College Hanover, NH, P01 CA80139, 08/99 - 07/2004, Funding Level: \$ 257,431.  
WPI Morgan Distinctive Instructorship: ME Faculty Advisor of Year Award 2004.

"MRI of Brain Function and Receptors in Cocaine Addiction", Co-PI with C. Ferris (PI), J.King (Co-PI), and D. Olson (Co-PI), NIH award, 6/01-5/06, Funding level \$1,609,560.

"Development and Refinement of Registration and Warping Algorithms Necessary to Transform MRI and Histological Images", with Co-PIs Q.Y. Zhang and Z. Wu, NIDA subcontract with University of Massachusetts Medical Center, Worcester, MA, 09/01 - 8/2006, Funding Level: \$ 377,463.

"Development of a model to predict accumulated radiation fields to assist in the therapeutic treatment within lumpectomy sites while maintaining substantially reduced dosages in surrounding normal breast tissues", PI, Advanced Radiation Therapy, LLC, Billerica, MA, 06/08 – 08/08, Funding Level: \$17,561.

Present: (\$1,061,424)

"Visualization Tools for Alternative Breast Cancer Imaging Modalities", NIH subcontract with Dartmouth College Hanover, NH, 5/06 – 4/11, Funding Level: \$ 402,559.

"Magnetic Resonance Microwave Absorption and Tomography Imaging", Co-PI with R. Ludwig (PI), NIH (R21/R33) subcontract with Dartmouth College, K. Paulsen (PI), 5-30902.5700, 2007-2010, WPI funding level \$ 464,416

- Member
- International Society for Magnetic Resonance in Medicine, (ISMRM) 2002-2007.
  - Society of Neuroscience, (SfN), 2004-2006.
  - International Society for Optical Engineering (SPIE), 2004-present.
  - Pi Tau Sigma, Honorary Mech. Eng. Society, 2/00-present
  - Faculty Advisor Pi Tau Sigma, 1999-present.
  - The Scientific Research Society, Sigma Xi.
  - The Manufacturing Honor Society, Sigma Mu Epsilon
- President of Dartmouth Society of Engineers, Student Chapter, (9/83 - 9/84).