

Curriculum Vitæ

Manil Suri

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- Education**
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|------|---|
| 1983 | Ph.D. in Mathematics, Carnegie-Mellon University, Pittsburgh. |
| 1980 | M.S. in Mathematics, Carnegie-Mellon University, Pittsburgh. |
| 1979 | B.S. in Mathematics, University of Bombay, Bombay. |
- Long-term Positions**
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| 1994– | Professor, Department of Mathematics and Statistics, University of Maryland Baltimore County. |
| 1989-94 | Associate Professor, Department of Mathematics and Statistics, University of Maryland Baltimore County. |
| 1983-89 | Assistant Professor, Department of Mathematics and Statistics, University of Maryland Baltimore County. |
- Short-term positions**
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| 1996 | ETH Zurich, Switzerland (August). |
| 1996 | University of Rennes, Rennes, France (June). |
| 1993 | Helsinki University of Technology, Helsinki, Finland (May-June). |
| 1992-93 | Brunel University, Uxbridge, England (Oct-Jan). |
| 1988 | INRIA (Institut National de Recherche en Informatique et en Automatique), Rocquencourt, France (Jan-Aug). |
- Research Interests** The solution of partial differential equations by the finite element method. Particular areas of interest: the p and hp versions, mixed finite elements, plate and shell problems, problems in fluid flow. Applications to commercial computational codes in structural and fluid mechanics. Mathematical outreach for K-12 and adult populations.
- Ph.D. Dissertations Directed**
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|------|---|
| 2003 | "A posteriori estimation of the linearization and finite element approximation errors for strongly monotone nonlinear operators," Alexandra Chaillou. |
| 1998 | "Non-conforming hp finite element methods," Padmanabhan Seshaiyer. |
| 1997 | "Locking-free hp mixed finite element methods for linear and geometrically non-linear elasticity," Lawrence Chilton. |
| 1996 | "The approximation of boundary layers in the hp version of the finite element method," Christos Xenophontos. |
| 1992 | "The effect of quadrature error in the p version of the finite element method," Chang G. Kim. |

Grants as Principal Investigator	2000-04	" hp finite element methods in failure prediction and material science." NSF (\$95,000)
	2000-01	"Conference on p and hp finite element methods." ARO (\$8,000)
	2000	"Conference on p and hp finite element methods." AFOSR (\$12,600)
	1998-01	"Standard, mixed and non-conforming hp finite element methods for problems in mechanics." AFOSR (\$103,850)
	1997-00	" hp Finite Element Methods for Shells and Partitioned Domains." National Science Foundation (\$76,000)
	1995-98	"Hierarchical hp Modeling and Locking Resolution in Laminated Plates and Shells." AFOSR (\$146,439)
	1992-95	"Hierarchical Modeling and Locking Effects in the Numerical Analysis of Multistructures." (co-PI: Christoph Schwab) AFOSR (\$222,530)
	1989-92	"Numerical Treatment of Differential and Integral Equations by the p and hp Versions of the Finite Element Method". AFOSR (\$132,352)
	1985-88	"Analysis of the Performance of Mixed Finite Element Methods", AFOSR (\$87,882)

Consultant *The MacNeal-Schwendler Corporation, Los Angeles, CA.*
 Development of non-conforming hp algorithms (adopted in commercial code MSC-NASTRAN).

Engineering Science and Research Development, Inc, St. Louis, MO.
 Development of hp meshing techniques for thin plates and shells (adopted in commercial code STRESS CHECK). Development of algorithms for calculation of buckling frequencies.

Associate Editor SIAM Journal on Numerical Analysis (1999-2004)
 Journal of Computational and Applied Mathematics (1993-present)

Publications in Refereed Journals

1. G. J. Fix and M. Suri, "Three-dimensional mass conserving elements for compressible flow", *Computers and Mathematics with Applications*, 11, 765-776 (1985).
2. M. Suri, "Mixed finite element methods for the approximation of time-dependent problems", *Numerical Methods for Partial Differential Equations*, 2, 101-111 (1986).
3. R.C. MacCamy and M. Suri, "A time-dependent interface problem for two-dimensional eddy currents", *Quarterly of Applied Mathematics*, XLIV, 675-690 (1987).
4. I. Babuška and M. Suri, "The optimal convergence rate of the p version of the finite element method", *SIAM Journal on Numerical Analysis*, 24, 750-776 (1987).
5. I. Babuška and M. Suri, "The hp version of the finite element method with quasiuniform meshes", *RAIRO Mathematical Modelling and Numerical Analysis*, 21, 199-238 (1987).
6. A. K. Aziz, A. B. Stephens and M. Suri, "Numerical methods for reaction-diffusion problems with non-differentiable kinetics", *Numerische Mathematik*, 53, 1-11 (1988).

7. I. Babuška and M. Suri, "The treatment of nonhomogeneous Dirichlet boundary conditions by the p version of the finite element method", *Numerische Mathematik*, 55, 97-121 (1989).
8. E. P. Stephan and M. Suri, "On the convergence of the p version of the boundary element Galerkin method", *Mathematics of Computation*, 52, 31-48 (1989).
9. I. Babuška, B. Guo and M. Suri, "Implementation of non-homogeneous Dirichlet boundary conditions in the p version of the finite element method", *Impact of Computing in Science and Engineering*, 1, 36-63 (1989).
10. M. Suri, "The p version of the finite element method for elliptic equations of order 2ℓ ", *RAIRO Mathematical Modelling and Numerical Analysis*, 24, 107-146 (1990).
11. M. Suri, "On the stability and convergence of higher order mixed finite element methods for second order elliptic problems", *Mathematics of Computation*, 54, 1-19 (1990).
12. I. Babuška and M. Suri, "The p and hp versions of the finite element method. An overview", *Computer Methods in Applied Mechanics and Engineering*, 80, 5-26 (1990).
13. E. P. Stephan and M. Suri, "The hp version of the boundary element method on polygonal domains with quasiuniform meshes", *RAIRO Mathematical Modelling and Numerical Analysis*, 25, 783-807 (1991).
14. M. Suri, "On the robustness of the h and p versions of the finite element method", *Journal of Computational and Applied Mathematics*, 35, 303-310 (1991).
15. F. Milner and M. Suri, "Mixed finite element methods for quasilinear second order elliptic problems: the p -version", *RAIRO Mathematical Modelling and Numerical Analysis*, 26, 913-931 (1992).
16. I. Babuška and M. Suri, "On locking and robustness in the finite element method", *SIAM Journal on Numerical Analysis*, 29, 1261-1293 (1992).
17. I. Babuška and M. Suri, "Locking effects in the finite element approximation of elasticity problems", *Numerische Mathematik*, 62, 439-463 (1992).
18. S. Jensen and M. Suri, "On the L_2 error for the p version of the finite element method over polygonal domains", *Computer Methods in Applied Mechanics and Engineering*, 97, 233-243 (1992).
19. U. Banerjee and M. Suri, "The effect of numerical quadrature in the p version of the finite element method", *Mathematics of Computation*, 59, 1-20 (1992).
20. U. Banerjee and M. Suri, "The analysis of numerical integration in p version finite element eigenvalue approximation", *Numerical Methods for Partial Differential Equations*, 8, 381-394 (1992).
21. C. Kim and M. Suri, "On the p version of the finite element method in the presence of numerical integration", *Numerical Methods for Partial Differential Equations*, 9, 593-629 (1993).
22. I. Babuška and M. Suri, "The p and hp versions of the finite element method: basic principles and properties", *SIAM Review*, 36, 578-632 (1994).
23. M. Suri, I. Babuška and C. Schwab, "Locking effects in the finite element approximation of plate models", *Mathematics of Computation*, 64, 461-482 (1995).
24. C. Schwab and M. Suri, "The optimal p version approximation of singularities on polyhedra in the boundary element method", *SIAM Journal on Numerical Analysis*, 33, 729-759 (1996).

25. R. Stenberg and M. Suri, "Mixed hp finite element methods for problems in elasticity and Stokes flow," *Numerische Mathematik*, 72, 367-390 (1996).
26. M. Suri, "Analytic and computational assessment of locking in the hp finite element method," *Computer Methods in Applied Mechanics and Engineering*, 133, 347-371 (1996).
27. C. Schwab and M. Suri, "The p and hp versions of the finite element method for problems with boundary layers," *Mathematics of Computation*, 65, 1403-1429 (1996).
28. J. Pitkäranta and M. Suri, "Design principles and error analysis for reduced-shear plate-bending finite elements," *Numerische Mathematik*, 75, 223-266 (1996).
29. M. Suri, "A reduced constraint hp finite element method for shell problems," *Mathematics of Computation*, 66, 15-29 (1997).
30. R. Stenberg and M. Suri, "An hp error analysis of MITC plate elements," *SIAM Journal on Numerical Analysis*, 34, 544-568 (1997).
31. L. Chilton and M. Suri, "On the selection of a locking-free hp element for elasticity problems," *Int. J. Numer. Meth. Eng.* 40, 2045-2062 (1997).
32. C. Schwab, M. Suri and C. Xenophontos, "The hp finite element method for problems in mechanics with boundary layers," *Comp. Meth. Appl. Mech. Eng.*, 157, 311-333 (1998).
33. M. Costabel, M. Dauge and M. Suri, "Numerical approximation of a singularly perturbed contact problem," *Comp. Meth. Appl. Mech. Eng.*, 157, 349-363 (1998).
34. C. Schwab and M. Suri, "Mixed hp finite element methods for problems in non-Newtonian and Stokes flows," *Comp. Meth. Appl. Mech. Eng.*, 175, 217-241 (1999).
35. P. Seshaiyer and M. Suri, "Uniform hp convergence results for the mortar finite element method," *Mathematics of Computation*, 69, 481-500 (2000).
36. J. Pitkäranta and M. Suri, "Upper and lower plate-bending error bounds for some plate-bending finite elements," *Numerische Mathematik*, 84, 611-648 (2000).
37. L. Chilton and M. Suri, "On the construction of stable curvilinear p version elements for mixed formulations of elasticity and Stokes' flow," *Numerische Mathematik*, 86, 29-48 (2000).
38. P. Seshaiyer and M. Suri, "hp submeshing via non-conforming finite element methods," *Comp. Meth. Appl. Mech. Engrg.*, 189, 1011-1030 (2000).
39. F. Ben Belgacem, P. Seshaiyer and M. Suri, "Optimal convergence rates of hp mortar finite element methods for second-order elliptic problems," *RAIRO Math. Mod. and Num. Anal.*, 34, 591-608 (2000).
40. L. Chilton and M. Suri, "Locking-free mixed hp finite element methods for curvilinear domains," *Comp. Meth. Appl. Mech. Engrg.*, 86, 29-48 (2000).
41. M. Suri, "The p and hp finite element method for problems on thin domains," *J. Comp. and Appl. Math.*, 128, 235-260 (2001).
42. S.I. Haan, P. Charalambides and M. Suri, "A specialized finite element for the study of woven composites," *Computational Mechanics*, 27, 445-462 (2001).
43. M. Dauge and M. Suri, "Numerical approximation of the spectra of non-compact operators arising in buckling problems," *J. Num. Math.*, 10, 193-219 (2002).
44. M. Suri, "Stable hp mixed finite elements based on the Hellinger-Reissner principle," *J. Comp. and Appl. Math.*, 174, 213-225 (2005).

45. M. Dauge and M. Suri, "On the asymptotic behavior of the discrete spectrum in buckling problems for thin plates," *Math. Meth. Appl. Sciences*, 29, 789-817 (2006).
46. A. Chaillou and M. Suri, "Computable error estimators for the approximation of nonlinear problems by linearized models," *Comp. Meth. Appl. Mech. Engrg.*, 196, 210-224 (2006).
47. A. Chaillou and M. Suri, "A posteriori estimation of the linearization error for strongly monotone nonlinear operators," *J. Comp. and Appl. Math.*, 205, 72-87 (2007)

Publications in Refereed Conference Proceedings

48. M. Suri, "Some optimal approximation results with applications to the h , p and hp versions of the finite element method", *Methods of Functional Analysis in Approximation Theory*, C. A. Micchelli, D. V. Pai, B. V. Limaye editors, 245-259, Birkhauser Verlag (1986).
49. M. Suri, "On uniform regularity estimates and robust approximations for parameter dependent problems", *Equadiff 91: International Conference on Differential Equations*, C. Perello, C. Simo and J. Sola-Morales (editors), Vol 2, pp 915-920, World Scientific, Singapore, 1993.
50. C. Schwab and M. Suri, "Locking and boundary layer effects in the finite element approximation of the Reissner-Mindlin plate model," *Mathematics of Computation 1943-1993: A half-century of computational mathematics* (W. Gautschi, ed.), Proc. Symposia Appl. Math., vol. 48, Amer. Math. Soc., Providence, R.I., 1994, pp. 367-371.
51. C. Schwab, M. Suri and C.A. Xenophontos, "Boundary layer approximation by spectral/ hp methods," ICOSAHOM 95 Proceedings, Edited by Andrew Ilin and Ridgway Scott, published by *Houston Journal of Mathematics*, 501-508 (1996).
52. P. Seshaiyer and M. Suri, "Convergence results for non-conforming hp methods: The mortar finite element method," *Proceedings of the tenth Domain Decomposition Conference, Contemporary Mathematics*, 218, 467-473 (1998).
53. M. Suri and C. Xenophontos, "Reliability of an hp algorithm for buckling analysis," *Proceedings of IASS-IACM 2000, Fourth International Colloquium on Computation of Shell and Spatial Structures*, 2000.

Books Edited

54. p and hp Finite Element Methods: Mathematics and Engineering Practice (p-FEM2000), Zohar Yosibash and Manil Suri, Editors, Special issue of *Int. J. Numer. Meth. Engng.* Vol 53, No. 1 (2002).
55. p and hp Finite Element Methods: Mathematics and Engineering Practice (p-FEM2000), Manil Suri and Zohar Yosibash, Editors, Special issue of *Computers and Mathematics with Applications* Vol 46, Issue 1 (2003).

Other mathematics-related publications

56. M. Suri, "The Tolman Trick" (a short story about the nature of proof and what it means to be a mathematician, published in a literary journal), *Subtropics*, 1, 85-101 (2006).
57. M. Suri, "Learn math or die" ("Mathe lernen oder sterben") (an essay about mathematics education in India, in a German-language cultural magazine), *Kulturaustausch*, 2006: IV, 36-37 (2006).

- Apr '97 American Mathematical Society Meeting, College Park, MD, April 12-13, "Uniform h_p estimates over partitioned domains"
- Jun '97 "First International Congress of the International Society for Analysis, Applications and Computing," University of Delaware, Newark, DE, Jun 2-6, "Mixed h_p methods for elasticity and flow problems"
- Aug '97 "US Congress on Computational Mechanics," San Francisco, CA, Aug 6-8, "Eigenvalue analysis of a three-dimensional buckling model"
- Aug '97 "Tenth International Conference on Domain Decomposition," Boulder, CO, Aug 10-14, "Uniform h_p estimates for partitioned domains"
- Sep '97 Pennsylvania State University, State College, PA, "Uniform h_p estimates over partitioned domains"
- Oct, '97 Semi-annual FEM conference, Cornell University, Ithaca, NY, October 10-11, 1997, "The h_p version for non-Newtonian fluid flow problems"
- Mar '98 US Naval Academy, Annapolis, MD, "The h_p finite element method over thin domains"
- Jun '98 "ICOSAHOM '98 (International Conference on Spectral and High Order Methods), Herzeliya, Israel, June 22-26, 1998, "Optimal approximation of singularities by non-conforming h_p finite element methods"
- May '99 "SIAM Annual Meeting," Atlanta, GA, May 12-15, 1999, "Non-conforming h_p finite elements: Mortaring techniques"
- Jul, '99 "ICIAM '99," Edinburgh, Scotland, Jul 5-9, 1999, "Optimal convergence rates of h_p mortar finite element methods"
- Jul, '99 "ICIAM '99," Edinburgh, Scotland, Jul 5-9, 1999, "On the approximation of spectra for buckling problems"
- Oct, '99 "AMS Sectional Meeting," Austin, TX, Oct 8-10, 1999, "hp methods for buckling problems"
- Apr, '00 "Elastic Shells: Modeling, Analysis and Numerics" MSRI, Berkeley, CA, Apr 17-28, 2000, "The numerical analysis of an h_p algorithm for the approximation of buckling problems"
- May, '00 " p and h_p Finite Element Methods: Mathematics and Engineering Practice" St. Louis, MO, May 31-June 2, 2000, **Organizer of Conference**, "Reliability of an h_p algorithm for buckling analysis"
- Jun, '00 "IASS - IACM 2000 Fourth International Colloquium on Computation of Shell and Spatial Structures" Chania, Crete, June 4-7, 2000, "Reliability of an h_p algorithm for buckling analysis"
- Apr, '01 "Conference in Honor of Jim Greenberg's 60th Birthday" Carnegie-Mellon University, Pittsburgh, April 20-21, 2001, "The approximation of the spectra of non-compact operators arising in buckling analysis"
- May, '01 Colloquium talk, Dept of Mathematics, University of New South Wales, Sydney, Australia, May 16, 2001, "The approximation of the spectra of non-compact operators arising in buckling analysis"
- May, '01 Colloquium talk, Tata Institute of Fundamental Research, Mumbai, India, May 31, 2001, "Fiction and finite elements"
- Jun, '01 "ICOSAHOM '01 (International Conference on Spectral and High Order Methods), Uppsala, Sweden, June 11-15, 2001, "Reliability of an h_p finite element method for buckling analysis"
- Oct, '01 Colloquium talk, NIST, Gaithersburg, MD, Oct 30, 2001, "The p and h_p finite element approximation of thin domains"
- Feb, '03 Workshop, Computational challenges in partial differential equations, Newton Institute, Cambridge, England, Feb 10-14, 2003.

- Sep, '03 Invited talk, Adaptivity in Finite Element Analysis: Models, Meshes and Polynomial Order, Physikzentrum Bad Honnef, Sep 8-10, 2003, "A posteriori estimation of the linearization and finite element approximation errors for strongly monotone nonlinear operators" (joint talk with A. Chaillou).
- Sep. '03 Seminar talk, Partial Differential Equation Seminar, Dept of Math and Stat, UMBC, Sep 22, 2003, "A stable hp mixed finite element method for viscoelasticity problems."
- Apr. '04 BIRS Workshop on Mathematics and Creative Writing, Banff International Research Station, Banff, Canada, Apr 17-22, 2004, "The Tolman Trick," a mathematical short story set at Oberwolfach.
- May, '04 "The Infinity Roadshow," multimedia talk, UMBC, May 5, 2004 (also presented at Meade Middle School, Apr 29 and Banneker High School, May 21).
- Jun, '04 ICOSAHOM '04 (International Conference on Spectral and High Order Methods), Providence, RI, June 21-25, 2004, Invited Minisymposium talk, "Stable hp mixed finite elements based on the Hellinger-Reissner principle."
- Jul, '05 "The Infinity Roadshow," multimedia talk, presented at Virginia Center for the Creative Arts in July and Charlestown Retirement Community in December.
- Jun, '06 "Artistic and historical exploration of infinity and its link to Calculus," Invited break out session at "Inquiry based learning," STEM seminar, UMBC, Jun 15, 2006.
- Sep, '06 "The Infinity Roadshow," multimedia talk, invited presentation at Sixth International Literature Festival, Berlin, Germany, Sep 6 - 16, 2006. Also presented at UMBC's 40th anniversary, Oct 21, 2006.
- Dec, '06 "Teaching mathematics in an integrated learning environment," Invited keynote address, STEM seminar, UMBC, Dec 2, 2006.