

Victor NISTOR

(includes a list of publications)

ADDRESS:

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EDUCATION:

Ph. D., University of California, Berkeley, 1990-91.

Ph. D. Thesis title: *A bivariant Chern character.*

M. A., University of Bucharest, Romania, 1985-86.

M.A. Thesis title: *Stable rank of certain tensor products.*

B. A., University of Bucharest, Romania, 1981-85.

B. A. Thesis title: *A limited absorption principle for short range perturbations.*

High School: Mathematical-Physics #1, specializing in Information Sciences, 1976-80.

EXPERIENCE:

1994 - Professor of Mathematics, Pennsylvania State University.

1994-97 Associate Professor (tenured), Pennsylvania State University.

1993-94 Assistant Professor, Pennsylvania State University.

1991-95 Benjamin Peirce Lecturer-Assistant Professor, Harvard University.

1986-91 Researcher, The Mathematical Institute of the Romanian Academy.

HONORS, AWARDS, AND PRIZES:

Sloan Fellow, July 1995 to June 1997.

National Young Investigator Award, August 1, 1994 to July 30, 1999.

First prize at four National ('77-'80) and two International ('78 and '79) mathematical high school competitions. First prize at the '81 Balkanic math contest for college students.

Honorary member of the Mathematical Institute of the Romanian Academy and of the Penn State Institute for Gravity and the Cosmos.

GRANT ACTIVITY:

NSF Grant OCI 0749202, title: "COLL. RESEARCH: Multigrid QCD at the Petascale."

NSF Grant DMS 0713743, title: "Research Experience in Numerical Methods for Partial Differential Equations with Singularities," August 2007 to July 2010.

NSF Grant DMS 0555831, title: "Applications of Operator Algebras and Index Theory to Analysis on Singular Spaces," December 2006 to October 2005.

NSF Grant DMS 0209497, title: "Multiscale methods for partial differential equations," (co-PI), August 2002 to July '05.

NSF Grant DMS 0200808, title: "Global Methods in the analysis on singular spaces and partial differential equations," August 2002 to July '05.

NSF-France International Collaborative Grant, OISE 99-81251, title: "Index theorems, residues, eta invariants, and foliations," July 2000 to June '03.

NSF Grant DMS 991981, title: “Analysis on singular spaces,” August 1999 to July ’02.

A grant to visit College de France, Paris, May 1994.

NSF Grant DMS 9203517, “Index theory and cyclic cohomology,” July ’92 to June ’95.

A grant to participate at ICM 1990 in Japan as a young mathematician.

VISITING POSITIONS:

- June 94 Invited Professor, University of Marseille, Luminy, France.
- May-July ’97 Invited Professor, Heidelberg University, Germany.
- 1997- Professor of Mathematics, Pennsylvania State University.
- March 1998 Invited Professor, Orsay University, France.
- June 1999 Invited Professor, Institute Fourier, Grenoble, France.
- July 1999 Invited Professor, Institute Desargues, Lyon, France.
- Jan. ’01 Invited Professor, Univ. Paul Sabatier, Toulouse, France.
- Feb.-June ’01 Visiting Scholar, Max Planck Institute for Mathematics, Germany.
- June ’04 Invited Professor, Institute Henri Poincaré, Paris.
- May ’05 Invited Professor, Nancy University.
- June ’05 Invited Professor, Clairmont-Ferrant University.
- March ’06 Invited Fellow, Institute of Computational Sc. and Eng., Austin, Texas.
- February ’07 Invited Professor, Institute Henri Poincaré, Paris, France.
- June-July ’07 Visiting Scholar, Max Planck Institute for Mathematic, Bonn, Germany.

CURRENT RESEARCH INTERESTS: *Numerical methods, Scientific Computing, Analysis of Partial Differential Equations, and Geometric Analysis.* My recent work is devoted mostly to “Numerical methods for differential operators on polyhedral domains,” to the “Generalized Finite Element,” and to “Numerical methods for differential operators with singular coefficients” (especially Schrödinger type operators). More recently I have become involved in research in Quantum Chromo Dynamics. Although my work so far was on linear elliptic PDEs, I am planning to use these results also for evolution equations and non-linear elliptic PDEs. I am especially interested in applications to Physics and other areas outside Mathematics. Past work included Pseudodifferential operators, Operator Algebras, Analysis on singular spaces, and Non-commutative Geometry. My current research builds on my earlier work.

SOFTWARE DEVELOPED

A FEM code in C for solving elliptic equations in the plane using graded meshes; together with Hengguang Li (available from my homepage).

SEMINARS ORGANIZED:

“Joint Altoona-University Park Interdisciplinary seminar on Partial Differential Equations and their applications.”

CONFERENCES ORGANIZED:

“Elliptic PDEs on Singular Domains: Computation and Theory,” a mini-symposium in the SIAM Conference on “Analysis of Partial Differential Equations,” December 2007.

“Finite Element Circus,” Penn State, November 2006.

Member of the Organizing Committee of the International conference “Partial differential equations on singular and non-compact manifolds,” Potsdam, August 2006.

Member of the Organizing Committee of the International conference “ C^* -algebras and index theory II,” Bedlewo, Poland, January 2006.

Joint Int. Meeting DMV-ÖMG-AMS, “Geometric analysis,” Mainz, June, 2005.

Member of the Organizing Committee of the International conference “ C^* -algebras and index theory,” Bedlewo, Poland, February 2004.

AMS session “Elliptic operators on non-compact manifolds,” Boston, October 2002.

Mini-workshop “Partial differential equations on non-compact manifolds,” Penn State, December 2002.

Joint Canad. Math. Soc.–AMS session “Non-commutative geometry,” Toronto, Sept. ’00.

AMS session “Operator Algebras and Non-commutative Geometry,” Penn State, Oct. ’98.

The workshop “Symplectic Geometry and Microlocal Analysis,” Penn State, April 1998.

OTHER PROFESSIONAL ACTIVITIES:

Reviewer for Math Reviews.

Referee for several journals, including: Advances in Mathematics, American Mathematical Journal, Communications in Mathematical Physics, Inventiones Mathematicae, Journal of functional analysis, London Mathematical Journal, Michigan Math. Journal, Topology.

Member of the NSF panels.

Member of the evaluation committee of the University of Western Ontario, 2002.

Member of numerous committees in the department (including: Promotion and Tenure, Graduate Studies, Undergraduate Studies, Policy, Graduate teaching assistants oversight).

Member of Graduate Exam Committees in several other departments, including: Economy, Education, Mechanical and Nuclear Engineering, Physics.

GRADUATE COURSES TAUGHT:

Partial Differential Equations; Evolution equations; Real Analysis; Algebraic Topology; Index theory; Cyclic homology; Scattering theory; Introduction to Applied Math.

GRADUATE STUDENTS:

Martin Bues, Ph.D. Harvard 1994 (joint with A. Jaffe), Catarina Carvalho, Ph.D. Oxford 2003 (joint with U. Tilmann), Shantanu Dave 2005, Dritan Muca (Masters 2005), Hengguang Li, Qingqin Qu, and Fara Delitsky (undergraduate).

TEACHING: Average at Penn State: 6.1 out of a maximum of 7 (after excluding most graduate courses, where scores above 6 are the norm, rather than the exception). Declared best teacher in the Mathematics department (Harvard CUE Guide ’93) and featured in a Harvard instructional video for foreign teachers.

HOBBIES: Sports (tennis, basketball, and, especially, soccer), Coaching soccer, Reading.

LANGUAGES: Romanian (native), English, French, Russian.

Publications

- [1] V. Nistor, *On a problem of Pompeiu concerning derivatives*, Revue Roum. Math. Pure et Appl. **27** (1982), 1053–1058.
- [2] V. Nistor, *Stable range for tensor products of extensions of \mathcal{K} by $C(X)$* , Journal of Operator Theory **16** (1986), 387–396.
- [3] V. Nistor, *Stable rank for a certain class of type I C^* -algebras*, Journal of Operator Theory **17** (1987), 365–373.
- [4] V. Nistor, *On the homotopy groups of the automorphism group of AF- C^* -algebras*, Journal of Operator Theory **19** (1988), 319–340.
- [5] V. Nistor, *Group cohomology and the cyclic cohomology of crossed products*, Inventiones Mathematicae **99** (1990), 411–424.
- [6] V. Nistor, *A bivariant Chern character for p -summable quasi-homomorphisms*, K -Theory **5** (1991), pages 193–211.
- [7] V. Nistor, *Fields of AF-algebras*, Journal of Operator Theory, **28** (1992), 3–25.
- [8] V. Nistor, *Cyclic cohomology of crossed products by algebraic groups*, Inventiones Mathematicae **12** (1993), 615–638.
- [9] V. Nistor, *Higher McKean-Singer index formulae and noncommutative geometry*, Contemporary Mathematics **145** (1993), 439–451.
- [10] V. Nistor, *A bivariant Chern-Connes character*, Ann. of Math. **138** (1993), 555–590.
- [11] J.-L. Brylinski and V. Nistor, *Cyclic cohomology of étale groupoids*, K -theory **8** (1994), 341–365.
- [12] V. Nistor, *On the Cuntz-Quillen boundary map*, Mathematical Reports of the Acad. of Sci. of the Royal Soc. of Canada **14** (1995), 203–208.
- [13] V. Nistor, *The index of operators on foliated bundles*, J. Funct. Anal. **141** (1996), 421–434.
- [14] N. Higson and V. Nistor, *Cyclic homology of totally disconnected groups acting on buildings*, J. Funct. Anal. **141** (1996), 466–495.
- [15] V. Nistor, *Higher index theorems and the boundary map in cyclic cohomology*, Documenta Mathematica (electronic) **2** (1997), 263–296.
- [16] V. Nistor, *Superconnections and non-commutative geometry*, Cyclic cohomology and non-commutative geometry (Waterloo), Fields Inst. Commun, vol. 17, Amer. Math. Soc, 1997, pages 115–136,
- [17] R. Melrose and V. Nistor, *K -theory of C^* -algebras of b -pseudodifferential operators*, Geometric and Functional Analysis **8**(1998), 88–122.
- [18] D. Kazhdan, V. Nistor, and P. Schneider, *Hochschild and cyclic homology of finite type algebras*, Selecta Math. **4** (1998), 321–359.
- [19] (editor, with Jean-Luc Brylinski, Ranee Brylinski, Boris Tsygan, and Ping Xu) *Advances in geometry*. Progress in Mathematics, 12, Birkhauser, Boston, 1999.
- [20] V. Nistor, A. Weinstein, and Ping Xu, *Pseudodifferential operators on differential groupoids*, Pacific J. Math. **189** (1999), 117–152.
- [21] V. Nistor, *On the kernel of the equivariant Dirac operator*, Ann. Global Anal. Geom. **17** (1999), 595–613.
- [22] V. Nistor, *Groupoids and the integration of Lie algebroids*, J. Math. Soc. of Japan **52** (2000), 847–868.
- [23] E. Leichtnam and V. Nistor, *Crossed product algebras and the homology of certain p -adic and adelic dynamical systems*, K -theory **21** (2000), 1–23.

- [24] R. Lauter, B. Monthubert, and V. Nistor, *Pseudodifferential analysis on groupoids*, Documenta Mathematica (electronic) **5** (2000), 625–655.
- [25] R. Lauter and V. Nistor, *On spectra of geometric operators on open manifolds and differentiable groupoids*, ERA–AMS **7** (2001), 45–53 (electronic).
- [26] P. Baum and V. Nistor, *Periodic cyclic homology of Iwahori-Hecke algebras*, C. R. Acad. Sci. Paris **332** (2001), 783–788.
- [27] M. Benameur and V. Nistor, Homology of complete symbols and non-commutative geometry, *Quantization of singular symplectic quotients*, 21–47, Progr. Math. 198, Birkäuser, 2001.
- [28] R. Lauter and V. Nistor, Analysis of geometric operators on open manifolds: a groupoid approach, *Quantization of singular symplectic quotients*, 181–230, Progr. Math. 198, Birkäuser, 2001.
- [29] V. Nistor, *Higher orbital integrals, Shalika germs, and the Hochschild homology of Hecke algebras of p -adic groups*, Int. J. Math. Math. Sci. **26** (2001), 129–160.
- [30] R. Lauter, B. Monthubert, and V. Nistor, *Invariance spectrale des algèbres d’opérateurs pseudodifférentiels*, CR Acad. Sci. Paris. **334** (2002), 1095–1099.
- [31] V. Nistor, *Asymptotics and index for families invariant with respect to a bundle of Lie groups*, Rev. Roumaine de Math. Pures et Appliq. **47** (2002), 451–483.
- [32] P. Baum and V. Nistor, *Periodic cyclic homology of Iwahori-Hecke algebras*, *K*-theory **27** (2002), 329–358.
- [33] V. Nistor, *An index theorem for gauge-invariant families: The case of solvable groups*, Acta Math. Hung. **99** (2003), 155–183.
- [34] M. Benameur and V. Nistor, *Homology of algebras of families of pseudodifferential operators*, Journal of Funct. Anal. **205** (2003), 1–36.
- [35] B. Ammann, R. Lauter, and V. Nistor, *Algebras of pseudodifferential operators on complete manifolds*, in ERA–AMS **9** (2003), 80–87 (electronic).
- [36] V. Nistor and E. Troitsky, *An index for gauge-invariant operators and the Dixmier-Douady invariant*, Trans. AMS. **356** (2004), 185–218 (electronic).
- [37] B. Ammann, R. Lauter, and V. Nistor, *On the geometry of Riemannian manifolds with a Lie structure at infinity*, Int. J. Math. and Math. Sciences **4** (2004), 161–193.
- [38] M. Mitrea and V. Nistor, A note on boundary value problems for manifolds with cylindrical ends, *Aspects of boundary problems in analysis and geometry*, Operator Theory Advances and Applications, 472–494, vol. 151, Birkhäuser, Basel-Boston-Berlin, 2004.
- [39] M. Benameur, J. Brodzki, and V. Nistor, Cyclic homology and pseudodifferential operators: a survey, *Aspects of boundary problems in analysis and geometry*, 239–264, Operator Theory Advances and Applications, vol. 151, Birkhäuser, 2004.
- [40] M. Benameur and V. Nistor, *Residues and homology for pseudodifferential operators on foliations*, Math. Scand. **94** (2004), 75–108.
- [41] B. Ammann, R. Lauter, V. Nistor, and A. Vasy, *Complex powers and non-compact manifolds*, Comm. Partial Differential Equations **29** (2004), no. 5-6, 671–705.
- [42] V. Nistor, Pseudodifferential operators on non-compact manifolds and analysis on polyhedral domains, *Proceedings of the Workshop on Spectral Geometry of Manifolds with Boundary and Decomposition of Manifolds*, Roskilde University, 307–328, Contemporary Mathematics, AMS, Rhode Island, 2005.
- [43] C. Bacuta, V. Nistor, and L. Zikatanov, *Improving the convergence of ‘high order finite elements’ on polygons and domains with cusps*, Numerische Math. **100** (2005), 165–184.

- [44] C. Bacuta, V. Nistor, and L. Zikatanov, *Improving the rate of convergence of ‘high order finite elements’ on polyhedra I: a priori estimates*, Numerical Functional Analysis and Optimization **26** (2005), 613–639.
- [45] R. Lauter, B. Monthubert, and V. Nistor, *Spectral invariance for certain algebras of pseudodifferential operators*, J. Inst. Math. Jussieu **4**, (2005), 405–442.
- [46] I. Babuška and V. Nistor, *Interior numerical approximation of boundary value problems with a distributional data*, Numerical Methods for Partial Differential Equations **2** (2006), 79–113.
- [47] A. Ammann, A. Ionescu, and V. Nistor, *Sobolev spaces on Lie manifolds and regularity for polyhedral domains*, Documenta Mathematica **11** (2006), 161–206 (electronic).
- [48] coeditor of C^* -algebras and elliptic theory. Papers from the International Conference held in Bedlewo, February 2004. Edited by B. Bojarski, A. Mishchenko, E. Troitsky, and A. Weber, in cooperation with D. Burghelea, R. Melrose and V. Nistor, 2006.
- [49] V. Nistor and E. Troitsky, *The Thom isomorphism theorem for gauge equivariant K -theory*, Proceedings of the conference “ C^* -algebras and elliptic theory,” 213–245, Trends Math., Birkhäuser, Basel, 2006.
- [50] V. Nistor, *A non-commutative geometry approach to the representation theory of reductive p -adic groups: Homology of Hecke algebras, a survey and some new results*, appeared in Max Planck Conference Proceedings, 2006.
- [51] A. Mazzucato and V. Nistor, *Mapping properties of heat kernels, maximal regularity, and semi-linear parabolic equations on noncompact manifolds*, Journal of Hyperbolic Equations **3** (2006), 599–631.
- [52] B. Ammann, R. Lauter, and V. Nistor, *Pseudodifferential operators on manifolds with a Lie structure at infinity*, Annals of Math. **165** (2007), 717–747.
- [53] A. Ammann and V. Nistor, *Weighted Sobolev spaces and regularity for polyhedral domains*, Computer Methods in Applied Mechanics and Engineering, **196** (2007), 3650–3659.
- [56] C. Bacuta, V. Nistor, and L. Zikatanov, *Improving the rate of convergence of ‘high order finite elements’ on polyhedra II: interpolation and mesh refinement*, Numerical Functional Analysis and Optimization **28** (2007), 775–824.
- [55] I. Babuška, V. Nistor, and N. Tarfulea, *Approximate Dirichlet boundary conditions in the Generalized Finite Element Method*, Mathematical Models and Methods in Applied Sciences **17** (2007), 2115–2142.
- [56] M. Mitrea and V. Nistor, *Boundary layer potentials on manifolds with cylindrical ends*, Czechoslovak Math. Journal **57** (2007), 1151–1197.

Manuscripts accepted for publication:

- [57] S. Moroianu and V. Nistor, *Index and homology of pseudodifferential operators I. Manifolds with boundary*, to appear in Proceedings of OAT Conference.
- [58] C. Debord, J.-M. Lescure, and V. Nistor *Groupoids and an index theorem for conical pseudo-manifolds*, to appear in Crelle J. Math.
- [59] I. Babuška, V. Nistor, and N. Tarfulea, *Approximate and low regularity Dirichlet boundary conditions in the Generalized Finite Element Method*, to appear in Journal of Computational and Applied Mathematics (Proceedings of FEMTEC Conference).
- [60] I. Babuška and V. Nistor, *Boundary value problems in spaces of distributions on smooth and polygonal domains*, to appear in Journal of Computational and Applied Mathematics (Proceedings of FEMTEC Conference).

- [61] B. Monthubert and V. Nistor, *A topological index theorem for manifolds with corners*, submitted in September 2005, to appear in Journal of the London Mathematical Society.
- [62] Hengguang Li and V. Nistor, *Analysis of a modified Schrödinger operator in 2D: regularity, index, and FEM*, submitted in June 2007, to appear in Journal of Computational and Applied Mathematics.

Manuscripts submitted for publication:

- [63] A. Mazzucato and V. Nistor, *Well posedness and regularity for the Elasticity equation with mixed boundary conditions on polyhedral domains and domains with cracks*, submitted in November 2006.
- [64] Hengguang Li, A. Mazzucato, and V. Nistor, *On the analysis of the Finite Element Method on general polygonal domains I: a priori estimates*, submitted September 2007.

Preprints and manuscripts in final preparation:

- [65] E. Hunsicker, V. Nistor, and J. Sofo, *Analysis of periodic Schrödinger operators I: regularity and approximation of eigenvalues*.
- [66] C. Bacuta, V. Nistor, and L. Zikatanov, *Boundary value problems and regularity on polyhedral domains*, IMA preprint #1984, August 2004.
- [67] J. Ditche and V. Nistor, *Layer potentials on domains with conical points*.
- [68] Hengguang Li, A. Mazzucato, and V. Nistor, *On the analysis of the Finite Element Method on general polygonal domains II: mesh refinement and implementation*.
- [69] I. Babuška, V. Nistor, and N. Tarfulea, *Numerical treatment of boundary conditions for higher order boundary value problems*.
- [70] E. Hunsicker, V. Nistor, and J. Sofo, *Analysis of periodic Schrödinger operators II: interpolation and mesh refinement*.
- [71] A. Mazzucato and V. Nistor, *Well posedness and regularity for the Navier–Stokes equations on polygonal domains*.
- [72] I. Babuška and V. Nistor, *A test study for the implementation of non-smooth boundary conditions in the Generalized Finite Element Method*.
- [73] J. Ditche and V. Nistor, *Layer potentials on three dimensional polyhedral domains*.
- [74] E. Hunsicker, V. Nistor, and J. Sofo, *Analysis and eigenvalues of Helium-type Schrödinger operators*.
- [75] E. Hunsicker, V. Nistor, and J. Sofo, *Analysis of one electron Schrödinger operators: regularity, decay, and approximation of eigenvalues*.

Note: All publications above were (or will be) refereed.