

Sergiu MOROIANU

Contact

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Research interests

Index theory on singular spaces, hyperbolic manifolds, spectral functions, algebras of pseudodifferential operators.

Education

2010 Qualification à la fonction de Professeur des universités (France);

2004 Habilitation à diriger des recherches, Université Paul Sabatier, Toulouse, France;

1999 PhD in Mathematics, dissertation: *Residue functionals on the algebra of adiabatic pseudo-differential operators*, MIT, USA;

1996 Licențiat în matematică, Universitatea București, România;

1994 DEA de Mathématiques, École Polytechnique, Palaiseau, France;

1991 Bacalaureat, Liceul de Informatică, București, România.

Work experience

- Since July 2005: Associate Professor, IMAR, Bucharest, Romania;
 - Dec. 2011: Invited Professor, École Polytechnique, Palaiseau, France;
 - Apr.-Jun. 2011: CNRS Visiting Professor (LEA MathMode), École Polytechnique, Palaiseau, France;
 - Sep.-Nov. 2010: Visiting Professor, École Normale Supérieure, France;
 - April 2006 – Oct. 2008: Director, SNSB Mathematics department;
 - Oct. 2007 Visiting Assistant Professor, Université Paul Sabatier, Toulouse, France;
 - Sep. 2004 – July 2005: Assistant professor, IMAR;
 - Oct. 2002 – Sep. 2004: Post-doc, Université Paul Sabatier, Toulouse;
 - Oct. 2001 – Sep. 2002: Post-doc, Universität Hamburg, Germany;
 - Aug. 1999 – Sep. 2001: Researcher, IMAR;
 - Sep. 1994 – Jul. 1999: Teaching Assistant, MIT, USA.
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Publications

- (1) *Fredholm Theory for degenerate pseudodifferential operators on manifolds with fibered boundaries*, (with Robert Lauter), *Comm. Partial Diff. Equat.* **26** (2001), 233–285.
- (2) *Homology of pseudo-differential operators on manifolds with fibered boundaries*, (with Robert Lauter), *J. Reine Angew. Math.* **547** (2002), 207–234.
- (3) *The index of cusp operators on manifolds with corners*, (with Robert Lauter), *Ann. Global Anal. Geom.* **21** (2002), 31–49.
- (4) *Sur la limite adiabatique des fonctions η et ζ* , *Comptes Rendus Math.* **334** (2002), 131–134.
- (5) *K-Theory of suspended pseudo-differential operators*, *K-Theory* **28** (2003), 167–181.
- (6) *Homology of pseudodifferential operators on manifolds with fibered cusps*, (with Robert Lauter), *T. Am. Mat. Soc.* **355** (2003), 3009–3046.
- (7) *Heat Kernel Asymptotics for Roots of Generalized Laplacians*, (with Christian Bär), *Int. J. Math.* **14** (2003), 397–412.

- (8) *Adiabatic limits of eta and zeta functions of elliptic operators*, Math. Z. **246** (2004), 441–471.
- (9) *Homology of adiabatic pseudo-differential operators*, Nagoya Math. J. **175** (2004), 171–221.
- (10) *An index formula on manifolds with fibered cusp ends*, (with Robert Lauter), J. Geom. Analysis **15** (2005), 261–283.
- (11) *Cusp geometry and the cobordism invariance of the index*, Adv. Math. **194** (2005), 504–519.
- (12) *Gravitational and axial anomalies for generalized Euclidean Taub-NUT metrics* (with Ion Cotăescu and Mihai Vişinescu), J. Phys. A – Math. Gen. **38** (2005), 7005–7019.
- (13) *On the L^p index of spin Dirac operators on conical manifolds*, (with André Legrand), Studia Math. **177** (2006), 97–112.
- (14) *On Carvalho’s K -theoretic formulation of the cobordism invariance of the index*, P. Am. Math. Soc. **134** (2006), 3395–3404.
- (15) *L^2 -index of the Dirac operator of generalized Euclidean Taub-NUT metrics* (with Mihai Vişinescu), J. Phys. A - Math. Gen. **39** (2006), 6575–6581.
- (16) *On the structure of quantum permutation groups* (with Teodor Banica), P. Am. Mat. Soc. **135** (2007), 21–29.
- (17) *Fibered cusp versus d -index theory*, Rendiconti Semin. Math. Padova. **117** (2007), 193–203.
- (18) *The Dirac spectrum on manifolds with gradient conformal vector fields*, (with Andrei Moroianu), J. Funct. Analysis. **253** nr. 1 (2007), 207–219.
- (19) *Weyl laws on open manifolds*, Math. Annalen **340**, nr. 1 (2008), 1–21.
- (20) *Index and homology of pseudodifferential operators on manifolds with boundary* (with Victor Nistor), Perspect. Operat. Algebras Math. Phys. (2008), 123–148.
- (21) *Spectral analysis of magnetic Laplacians on conformally cusp manifolds* (with Sylvain Golénia), Ann. H. Poincaré **9** (2008), 131–179.
- (22) *Adiabatic limit of the eta invariant over cofinite quotients of $PSL(2, R)$* (with Paul Loya and Jinsung Park), Compositio Mat. **144** (2008), 1593–1616.
- (23) *Quasi-fuchsian manifolds with particles* (with Jean-Marc Schlenker), J. Differ. Geom. **83** (2009), 75–129.
- (24) *The spectrum of k -form Schrödinger Laplacians on conformally cusp manifolds* (with Sylvain Golénia), Trans. Amer. Math. Soc., to appear.
- (25) *Regularity of the eta function on manifolds with cusps*, (with Paul Loya and Jinsung Park), Math. Zeitschrift, to appear.
- (26) *Eta invariant and Selberg Zeta function of odd type over convex co-compact hyperbolic manifolds*, (with Colin Guillarmou and Jinsung Park), Advances in Math. **225** (2010), no. 5, 2464–2516.
- (27) *The Dirac operator on generalized Taub-NUT spaces*, (with Andrei Moroianu), Commun. Math. Phys. **305** (2011), 641–656.
- (28) *Bergman and Calderón projectors for Dirac operators*, (with Colin Guillarmou and Jinsung Park), preprint arXiv:1009.3179, submitted.
- (29) *On the Singularities of the Zeta and Eta functions of an Elliptic Operator*, (with Paul Loya and Raphael Ponge), preprint arXiv:1010.4039, Int. J. Math., to appear.
- (30) *Uniformization of S^2 and flat singular surfaces*, preprint arXiv:1101.2355, submitted.
- (31) *Chern-Simons line bundle on Teichmüller space*, (with Colin Guillarmou), preprint arXiv:1102.1981, submitted.
- (32) *The Cauchy problems for Einstein metrics and parallel spinors*, (with Bernd Ammann and Andrei Moroianu), preprint arXiv:1106.2066, submitted,

Courses and talks

- *Courses:*
 - “Riemann surfaces”, Școala Normală Superioară Bucharest, 2009.
 - Mini-course ”Spectral asymptotics for Dirac operators”, Korea Institute of Advanced Studies summer school, 2007.
 - ”Hyperbolic manifolds in dimensions 2 and 3”, Școala Normală Superioară Bucharest, 2007 (with Jean-Marc Schlenker);
 - “ K -theory and differential operators”, Școala Normală Superioară, 2005;
 - “Algebraic Topology”, University of Bucharest, 2005;
 - Mini-course ”Introduction to Global Analysis”, Instituto Superior Tecnico, Lisbon, Feb. 2002;
 - ”Differential geometry”, University of Pitești, 2001;
 - ”Mathematical methods for engineers”, MIT, 1999;
 - ”Differential equations”, MIT, 1998;
 - ”Linear Algebra”, MIT, 1997.
- *Conference talks:*
 - CAIM 20, Iași, Sep. 2011.
 - *Microlocal Methods in Mathematical Physics and Global Analysis*, Tübingen, Jun. 2011.
 - *Analysis, Geometry and Surfaces*, Autrans, Mar. 2011.
 - *Lectures on Spectral invariants and Moduli spaces*, KIAS, Jun. 2010.
 - *IMAR 60 International Conference*, Bucharest, Jun. 2009.
 - *Geometric Applications of Microlocal Analysis*, Luminy, Jun. 2008.
 - *Workshop on Analysis and Geometry*, Hannover, Sep. 2007.
 - *Spectral problems for Dirac and Laplace operators*, Paris, Jan. 2007.
 - *Spectral theory and Global Analysis*, Oldenburg, Aug. 2006.
 - *PDE’s on noncompact and singular manifolds*, Potsdam, Aug. 2006.
 - *KIAS Workshop on Spectral Invariants and Related Topics*, Seoul, May 2006.
 - 7th Intl. Workshop on Differential Geometry and its Applications, Deva, Sept. 2005;
 - *Analysis and Geometric Singularities*, Oberwolfach, Aug. 2005;
 - *Second joint meeting of AMS, DMV, ÖMV*, Mainz, Iun. 2005;
 - *Degenerate PDE’s and Singular Geometries*, Potsdam, Aug. 2004;
 - *Analyse Géométrique*, CIRM Marseille, March 2004;
 - *Operator Algebras, Singularities, Deformation Quantisation*, Potsdam, March 2004;
 - *Operator algebras on manifolds with singularities*, Potsdam, March 2003;
 - *Journées Nancéiennes de Géométrie*, Nancy, Jan. 2003;
 - *Geometric analysis and singular spaces*, Oberwolfach, June 2002;
 - 5th Intl. Workshop on Differential Geometry and its Applications, Timișoara, Sept. 2001;
 - *Ellipticity and Parabolicity in Analysis and Geometry*, Potsdam, Aug. 2001;
 - *Geometric Analysis*, Potsdam, Oct. 2000;
 - *L^2 -Methods in Geometry*, Sarasota, Jan. 2000;
 - 4th Intl. Workshop on Differential Geometry and its Applications, Brașov, Sept. 1999;
 - *Operator Algebras and Asymptotics on Manifolds with Singularities*, Warsaw, April 1999.

- *Seminar invited talks*

- 2011: Regensburg; Nantes.
- 2010: Toulouse; IHP Paris.
- 2009: Bucharest.
- 2007: Chişinău; Toulouse.
- 2006: Toulouse.
- 2005: Potsdam.
- 2004: Bucharest.
- 2003: École Polytechnique; HU Berlin; École Normale Lyon; Clermont-Ferrand.
- 2002: IST Lisbon; Paris 6.
- 2001: Paris 11; Mainz.

Honors and awards

- Romanian Academy prize "Simion Stoilow", 2003 (awarded in 2005).
- National Foundation for Science and Arts prize, 2004.
- International Mathematical Olympiads
 - 1991: first prize (42 pts.);
 - 1990: second prize.

Community work

- 2011– Member of the Mathematics commission CNATDCU of the Ministry of Research.
- 2009 Organizer of three international Workshops on Differential Geometry and its applications: Cluj-Napoca (2007), Iaşi (2009) and Constanţa (2011).
- 2006–2008 Director of the Mathematics department of Şcoala Normală Superioară Bucharest.
- Editor of three proceedings volumes for the International Workshops on Differential Geometry and its applications: Deva 2005, Cluj-Napoca 2007, Iasi 2009.
- 2006– Member of the Users Committee SCUC for Zentralblatt Math.

Languages

- Romanian: native;
- English, French: fluent;
- German: advanced;
- Italian, Portuguese, Spanish: beginner.