

# Andrei A. Agrachev

## Curriculum Vitae

### Mailing Address

International School for Advanced Studies  
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### Born

March 29, 1952. Moscow, USSR

### Education

Moscow State University, 1969 – 1977 (undergraduate, graduate, and post-graduate studies)

### Degrees and Honors

- Ph.D., Moscow State University 1977. Title of Ph.D. Thesis: “Second Order Necessary Optimality Conditions.”
- Doctor of Sciences, Steklov Mathematical Institute 1989. Title of Doctoral Dissertation: “Topology of Quadratic Mappings and Optimal Control Theory.”
- Soviet Academy of Sciences Award in Mathematics, 1989.
- Invited Speaker at the International Congress of Mathematicians ICM-94 in Zürich, Switzerland.
- Member of the Nevanlinna Prize Committee of the International Mathematical Union for ICM-2002 in Beijing, China.
- American Mathematical Society featured review, 2002.

- Panel core member of the International Mathematical Union for ICM-2010 in Hyderabad, India.
- Chair Jean D’Alambert, 2016.

## Professional Activity

- All-Union Institute for Scientific Information (VINITI), Moscow, Russia, 1977 – 92. Positions: researcher, senior researcher, leading researcher.
- Steklov Mathematical Institute, Moscow, Russia, 1992 – present. Positions: leading researcher, external collaborator.
- Moscow State University, Department of Mechanics and Mathematics, 1989 – 1997. Positions: associate professor, full professor.
- International School for Advanced Studies, Trieste, Italy, 2000 – present. Position: full professor.
- Member of scientific committees of the international conferences: NOLCOS’92 at Bordeaux, France; NOLCOS’95 at Taxoe City, USA; MTNS’96 at St. Louis, USA; NOLCOS’98 at Twente, The Netherlands; Differential Equations and Dynamical Systems, 2000, 2006, 2008, 2010, 2012 at Suzdal, Russia; Feedback and Optimal Control, 2003 at Siena, Italy; NOLCOS’04 at Stuttgart, Germany; IFIP TC7, 2005 at Turin, Italy; NOLCOS’07 at Pretoria, South Africa; Mathematical Control Theory: Controllability, Optimization, Stability, 2009 at Turin, Italy; New Trends in Sub-Riemannian Geometry, 2010 at Nice, France; trimester “Combinatorics and Control”, 2010 at Madrid, Spain; NOLCOS’10 at Bologna, Italy; several conferences in SISSA, Trieste, and many others.
- Director of the Summer School on Mathematical Control Theory, 2001, ICTP, Trieste, Italy.
- Co-director of the European multi-partner Marie Curie Training Site, 2002 – 2006.
- Director of the Trimester on Dynamical and Control Systems, 2003, SISSA–ICTP, Trieste, Italy.

- National coordinator of the MIUR research projects in 2002 – 2003, 2005 – 2006, 2007 – 2008 and 2010 – 2011.
- Member of the scientific committee of the European Research Group project “Control of partial differential equations” started in 2010.
- Head of the research project “Geometric control theory and analysis on metric structures” supported by the Russian Federation, 2013 – 2015.
- Co-organizer of the Trimester “Geometry, analysis and dynamics on subriemannian manifolds”, 2014, Institute Henri Poincaré, Paris, France.
- Associate Editor of the SIAM Journal on Control and Optimization, 1993 – 1998.
- Editor-in-Chief of the Journal of Dynamical and Control Systems since 2003 (managing editor, 1995 – 2002); member of the editorial boards of other 5 journals.
- Member of the Board of the Moscow Mathematical Society, 1996 – 1998.
- Scientific consultant of the International Center for Theoretical Physics, Trieste, Italy, 2001 – 2003.
- Selected visiting positions: Institute for Mathematics and its Applications, Minneapolis, USA (Feb. – March 1993); University of Florence, Italy (Nov. 1994 – Feb. 1995, Nov. – Dec. 1996); Bourgogne University, France (May – July 1996, Oct. – Dec. 1997, Feb. – June 1998, May – July 1999); Institute Henri Poincaré, Paris, France (Jan. 1998); International School for Advanced Studies, Trieste, Italy (Nov. – Dec. 1998, Feb. – Apr. 1999, Sept. 1999 – Jan. 2000); Mittag Leffler Institute, Sweden (March – Apr. 2003); University of Nice, France (April – May 2007, May – June 2008); Ecole Polytechnique, France (Fall 2013, Fall 2016 and Spring 2017); Institute Henri Poincaré, France (Fall 2014)
- Over 140 research papers on Control Theory, Optimization, Geometry, and the book “Control Theory from the Geometric Viewpoint” with Yu. Sachkov (Springer Verlag, 2004, xiv+412 pp.).

## Former Ph. D. students

- Andrey Sarychev, 1980, Phys.-Tech. Univ., Moscow.
- Igor Zelenko, 2002, Technion, Haifa.
- Mario Sigalotti, 2003, SISSA, Trieste.
- Natalia Chtcherbakova, 2004, SISSA, Trieste.
- Thomas Chambrion, 2004, Univ. de Bourgogne, Dijon.
- Ulysse Serres, 2006, Univ. de Bourgogne, Dijon.
- Paolo Mason, 2006, SISSA, Trieste.
- Francesca Chittaro, 2007, SISSA, Trieste.
- Sergio Rodrigues, 2008, Univ. of Aveiro.
- Marco Caponigro, 2009, SISSA, Trieste
- Chengobo Li, 2009, SISSA, Trieste
- Francesco Rossi, 2009, SISSA, Trieste
- Roberta Ghezzi, 2010, SISSA, Trieste
- Antonio Lerario, 2011, SISSA, Trieste
- Davide Barilari, 2011, SISSA, Trieste
- Luca Rizzi, 2014, SISSA, Trieste
- Dario Prandi, 2014, SISSA, Trieste
- Alessandro Gentile, 2014, SISSA, Trieste
- Pavel Silveira Diaz, 2015, SISSA, Trieste
- Elisa Paoli, 2015, SISSA, Trieste
- Francesco Boarotto, 2016, SISSA, Trieste
- Carolina Biolo, 2017, SISSA, Trieste

## Some Recent Papers

1. Generalized Ricci curvature bounds for three dimensional contact subriemannian manifolds. *Math. Ann.*, 2014, v.360, 209–253 (with P. Lee)
2. On the Hausdorff volume in sub-Riemannian geometry. *Calculus of Variations and Part. Dif. Eq.*, 2012, v.43, 355–388 (with D. Barilari, U. Boscain)
3. Sub-Riemannian structures on 3D Lie groups. *J. Dynamical and Control Systems*, 2012, v.18, 21–44 (with D. Barilari)
4. On robust Lie-algebraic stability conditions for switched linear systems. *Systems and Control Letters*, 2012, v.61, 347–353 (with Yu. Baryshnikov, D. Liberzon)
5. Systems of quadratic inequalities. *Proceed. London Math. Soc.*, 2012, v.105, 622–660 (with A. Lerario)
6. Bishop and Laplacian comparison theorems on 3D contact sub-Riemannian manifolds with symmetry. *J. Geom. Anal.*, 2015, v.25, 512–535 (with P. Lee)
7. Quadratic cohomology. *Arnold Math. J.*, 2015, v.1, 37–58
8. Some open problems. In: “Geometric Control Theory and Sub-Riemannian Geometry”, Springer INDAM Series, 2014, 1–13
9. Curvature: a variational approach. *Memoirs AMS*, to appear (with D. Barilari and L. Rizzi)
10. On conjugate times for LQ optimal control problems. *J. Dynamical and Control Systems*, 2015, v.21, 625–641 (with L. Rizzi and P. Silveira)
11. Geodesics and horizontal-path spaces in Carnot groups. *Geometry & Topology*, 2015, v.19, 1569–1630 (with A. Gentile and A. Lerario)
12. Tangent hyperplanes to subriemannian balls. *J. Dynamical and Control Systems*, 2016, v.22, 683–692
13. Sub-Riemannian curvature in contact geometry. *J. Geom. Anal.*, 2017, v.27, 366–408 (with D. Barilari and L. Rizzi)

14. Intrinsic random walks in Riemannian and sub-Riemannian geometry via volume sampling. *J. ESAIM:COCV*, to appear (with U. Boscain, R. Neel, L. Rizzi)
15. Volume geodesic distortion and Ricci curvature for Hamiltonian dynamics (with D. Barilari, E. Paoli)
16. Homotopically invisible singular curves. *Calculus of Variations and PDEs*, to appear (with F. Boarotto, A. Lerario)
17. Introduction to geodesics in sub-Riemannian geometry. In: Barilari D., Boscain U., Sigalotti M. (Eds), *Geometry, Analysis and Dynamics on sub-Riemannian manifolds*, v.II. EMS SERIES OF LECTURES IN MATHEMATICS, 2016, 1–83 (with D. Barilari, U. Boscain)
18. Ensemble controllability by Lie algebraic methods. *J. ESAIM:COCV*, 2016, v.22, 921–938 (with Yu. Baryshnikov, A. Sarychev)
19. Switching in time-optimal problem. The 3-D case with 2-D control. *J. Dynamical and Control Systems*, 2017, v.23, 577–595 (with C. Biolo)
20. Topics in subriemannian geometry. *Russian Math. Surveys*, 2016, v.71:6, 3–36
21. Switching in time-optimal problem with control in a ball. *SIAM J. on Control and Optimization*, to appear (with C. Biolo)
22. Symplectic geometry of constrained optimization. (with I. Beschastnyi)
23. Optimality of broken extremals. (with C. Biolo)