

CURRICULUM VITAE

Dmitry V. Zenkov

Department of Mathematics
North Carolina State University

Raleigh, NC 27695

Phone: (919)–515–4201

Email: dvzenkov at ncsu dot edu

URL: <http://www4.ncsu.edu/~dvzenkov/>

Research Interests

- Geometric mechanics
- Nonholonomic systems
- Nonlinear stability and control
- Integrable systems
- Variational integrators, with applications to long-term numerical simulations of mechanical systems and stabilization

Education

1993–1998 Ph.D. Mathematics, Department of Mathematics,
The Ohio State University

1986–1989 Graduate School, Department of Mechanics and Mathematics,
Moscow State University

1981–1986 M.S. (Honors), Mathematics and Mechanics, Department of Mechanics and Mathematics,
Moscow State University

Appointments

2006– Associate Professor, Department of Mathematics, North Carolina State University

Sept/Oct 2011 Visiting Professor, Beijing Institute of Technology, Beijing, China

2001–2006 Assistant Professor, Department of Mathematics, North Carolina State University

1998–2001 GIG Assistant Professor (temporary), Department of Mathematics, the University of Michigan

Summers Summer Research Position

1996/1997 Department of Mathematics, the University of Michigan

Summers Research Assistant

1994/1995 Department of Mathematics, the Ohio State University

1993–1998 Teaching Assistant

Department of Mathematics, the Ohio State University

Awards and Fellowships

1998–2001 Group Infrastructure Grant at the University of Michigan

1999 The University of Michigan Rackham Faculty Fellowship

1993 Summer Fellowship, the Ohio State University

1989 Award for Distinguished Teaching of evening classes for high school students,
Moscow State University

1984–1986 Award for Excellence in Course Work, Moscow State University

Grants

2012– National Science Foundation Grant DMS–1211454

2009– National Science Foundation Grant DMS–0908995

2006–2010 National Science Foundation Grant DMS–0604108

2003–2008 National Science Foundation Grant DMS–0306017

2013 Travel Grant to visit the Beijing Institute of Technology

- 2012 Travel Grant to visit the Beijing Institute of Technology
- 2011 Travel Grant to visit the Ostrava University and the 17th Summer School on Global Analysis
- 2011 Travel Grant to visit the Beijing Institute of Technology
- 2010 Travel Grant to visit the Beijing Institute of Technology
- 2006 Travel Grant to attend the Workshop on Numerical Integration of Nonholonomic Systems, Madrid, Spain
- 2006 Travel Grant to attend the International Workshop on Differential-Geometric Methods in Theoretical Mechanics (Satellite ICM Conference), Madrid, Spain
- 2005 Travel Grant to attend the Research Thematic Trimester on Control, Geometry and Engineering, CRM, Barcelona, Spain
- 2003 Travel Grant to attend ICIAM, Sydney, Australia
- 2002 Travel Grants to attend the Fields Institute, the 4th International Conference on Dynamical Systems and Differential Equations, and MTNS
- 2000 Travel Grants to attend the 39th IEEE Conference on Decision and Control and the 3rd International Conference on Dynamical Systems and Differential Equations

Graduate Students

- 2004–2007 Jason Osborne (PhD, May 2007)
- 2006–2010 David Long (PhD, July 2010)
- 2007–2011 Yuanyuan Peng (PhD, July 2011)
- 2010– Kenneth Ball
- 2012– Sean Clemens

REG Students

- 2008 Kenneth Ball
- 2008 Kimberly Ward

REU Students

- 2007 Cameron Lynch
- 2008 Yakov Berchenko–Kogan
- 2010 Syrena Huynh

Publications

1. Zenkov, D.V. and V.V. Kozlov [1988] On Geometric Poincaré Interpretation for an n -Dimensional Rigid Body. *Tr. Sem. Vect. Tenz. An.* **23**, 202–204.
2. Zenkov, D.V. [1989] On Asymptotic Stability of Periodic Motions in Nonholonomic Mechanics. *Vestnik Moskov. Univ. Ser. I Math. Mekh.* **3**, 46–51.
3. Zenkov, D.V. [1991] On the Routh Problem. *Vestnik Moskov. Univ. Ser. I Math. Mekh.* **3**, 87–89.
4. Zenkov, D.V. [1991] On the Problem of a Sphere Rolling over a Surface of Revolution. *Vestnik Moskov. Univ. Ser. I Math. Mekh.* **4**, 94–96.
5. Zenkov, D.V. [1995] The Geometry of the Routh Problem. *J. Nonlinear Sci.* **5**, 503–519.
6. Zenkov, D.V., A.M. Bloch, and J.E. Marsden [1998] The Energy-Momentum Method for Stability of Nonholonomic Systems. *Dynamics and Stability of Systems* **13**, 123–165.
7. Zenkov, D.V., A.M. Bloch, and J.E. Marsden [1999] Stabilization of the Unicycle with Rider. *Proc. CDC* **38**, 3470–3471.
8. Zenkov, D.V. and A.M. Bloch [2000] Dynamics of the n -Dimensional Suslov Problem. *Journal of Geometry and Physics* **34**, 121–136.
9. Zenkov, D.V., A.M. Bloch, N.E. Leonard, and J.E. Marsden [2000] Matching and Stabilization of the Unicycle with Rider. *Proc IFAC*, 2 pp.
10. Zenkov, D.V., A.M. Bloch, N.E. Leonard, and J.E. Marsden [2000] Matching and Stabilization of Low-Dimensional Nonholonomic Systems. *Proc. CDC* **39**, 1289–1295.

11. Zenkov, D.V. and A.M. Bloch [2001] Dynamics of Generalized Euler Tops with Constraints. *Discrete and Continuous Dynamical Systems (extended volume)*, 398–405.
12. Zenkov, D.V., A.M. Bloch, and J.E. Marsden [2002] The Lyapunov–Malkin Theorem and Stabilization of the Unicycle with Rider. *Systems and Control Letters* **45**, 293–302.
13. Zenkov, D.V., A.M. Bloch, and J.E. Marsden [2002] Flat Nonholonomic Matching. *Proc. ACC*, 2812–2817.
14. Zenkov, D.V. [2002] Stabilization of Linear Controlled Lagrangian Systems, *Proc. MTNS*, 8 pp.
15. Zenkov, D.V. [2003] Linear Conservation Laws of Nonholonomic Systems with Symmetry. *Discrete and Continuous Dynamical Systems (extended volume)*, 963–972.
16. Zenkov, D.V. and A.M. Bloch [2003] Invariant Measures of Nonholonomic Flows with Internal Degrees of Freedom. *Nonlinearity* **16**, 1793–1807.
17. Zenkov, D.V. [2003] Nonholonomic Mechanics, Conservation Laws, and Control. *Proc. APM 2003*, 12 pp.
18. Zenkov, D.V., A.M. Bloch, and J.E. Marsden [2003] Controlled Lagrangian Methods and Tracking of Accelerated Motions. *Proc. CDC* **42**, 533–538.
19. Gunduz, A., A. Ben Hamza, H. Krim, and D.V. Zenkov [2004] Topology Coding via Distance Function Based Reeb Graphs. *Proc. ACIVS*, 5 pp.
20. Bloch, A.M., J.E. Marsden, and D.V. Zenkov [2005] Nonholonomic Dynamics. *Notices of the AMS* **52**, 324–333.
21. Fedorov, Yu.N. and D.V. Zenkov [2005] Dynamics of the Discrete Chaplygin Sleigh. *Discrete and Continuous Dynamical Systems (extended volume)*, 258–267.
22. Fedorov, Yu.N. and D.V. Zenkov [2005] Discrete Nonholonomic LL systems on Lie Groups. *Nonlinearity* **18**, 2211–2241.
23. Baloch, S., H. Krim, I. Kogan, and D.V. Zenkov [2005] Rotation Invariant Topology Coding of 2D and 3D Objects Using Morse Theory. *Proc. CIP*, Vol. III, 796–799.
24. Baloch, S., H. Krim, I. Kogan, and D.V. Zenkov [2005] 3D Object Representation with Topo-Geometric Shape Models. *Proc. EUSIPCO*, 4 pp.
25. Osborne, J. and D.V. Zenkov [2005] Steering the Chaplygin Sleigh by a Moving Mass. *Proc. CDC* **44**, 1114–1118.
26. Bloch, A.M., M. Leok, J.E. Marsden, and D.V. Zenkov [2005] Controlled Lagrangians and Stabilization of the Discrete Cart-Pendulum System. *Proc. CDC* **44**, 6579–6584.
27. Bloch, A.M., M. Leok, J.E. Marsden, and D.V. Zenkov [2006] Controlled Lagrangians and Potential Shaping for Stabilization of Discrete Mechanical Systems. *Proc. CDC* **45**, 3333–3338.
28. Long, D., and D.V. Zenkov [2007] Relaxed Matching and Stabilization of Relative Equilibria, *Proc. CDC* **46**, 6238–6243.
29. Bloch, A.M., M. Leok, J.E. Marsden, and D.V. Zenkov [2007] Matching and Stabilization of Discrete Mechanical Systems, *PAMM* **7**, 1030603–1030604.
30. Long, D.A., A.M. Bloch, J.E. Marsden, and D.V. Zenkov [2008] Relaxed Matching for Stabilization of Mechanical Systems, *Proc. MTNS*, 12 pp.
31. Bloch, A.M., J.E. Marsden, and D.V. Zenkov [2009] Quasivelocities and Symmetries in Nonholonomic Systems, *Dynamical Systems: An International Journal* **24**, 187–222.
32. Chang, D-E., D.A. Long, and D.V. Zenkov [2009] On Embedding of Control Systems into Euclidean Space, *Proc. ICCAS–SICE*, 1542–1546.
33. Lynch, C., and D.V. Zenkov [2009] Stability of Stationary Motion of Discrete-Time Nonholonomic Systems, In: V.V. Kozlov, S.N. Vassilyev, A.V. Karapetyan, N.N. Krasovskiy, V.N. Tkhai, and F.L. Chernousko, eds., *Problems of Analytical Mechanics and Stability Theory. Collection of Papers Dedicated to the Memory of Academician Valentin V. Rumyantsev*, Fizmatlit, Moscow, 259–271, (In Russian, Invited paper).
34. Bloch, A.M., J.E. Marsden, and D.V. Zenkov [2009] Quasivelocities and Stabilization of Relative Equilibria of Underactuated Nonholonomic Systems. *Proc. CDC* **48**, 3335–3340.
35. Bloch, A.M., M. Leok, J.E. Marsden, and D.V. Zenkov [2010] Controlled Lagrangians and Stabilization of Discrete Mechanical Systems, *Discrete and Continuous Dynamical Systems–Series S* **3**, 19–36.

36. Lynch, K.M., A.M. Bloch, S.V. Drakunov, M. Reyhanoglu, and D.V. Zenkov [2010] Control of Nonholonomic and Underactuated Systems, *In: Levine, W.S. (Ed.), The Control Handbook: Control System Advanced Methods*, 2nd edition, pp. 42.1–42.36, CDC Press, Taylor and Francis.
37. Ohsawa, T., O.E. Fernandez, A.M. Bloch, and D.V. Zenkov [2011] Nonholonomic Hamilton–Jacobi Theory via Chaplygin Hamiltonization, *Journal of Geometry and Physics* **61**, 1263–1291.
38. Maruskin, J.M., A.M. Bloch, J.E. Marsden, and D.V. Zenkov [2012] A Fiber Bundle Approach to the Transpositional Relations in Nonholonomic Mechanics, *J. Nonlinear Science* **22**, 431–461.
39. Ball, K.R., D.V. Zenkov, and A.M. Bloch [2012] Variational Structures for Hamel's Equations and Stabilization, *Proc. IFAC*, 178–183.
40. Peng, Y., S. Huynh, D.V. Zenkov, and A.M. Bloch [2012] Controlled Lagrangians and Stabilization of Discrete Spacecraft with Rotor, *Proc CDC* **51**, 1285–1290.
41. Zenkov, D.V., M. Leok, and A.M. Bloch [2012] Hamel's Formalism and Variational Integrators on a Sphere, *Proc CDC* **51**, 7504–7510.
42. Long, D.A., A.M. Bloch, J.E. Marsden, and D.V. Zenkov [2012] Relaxed Matching for Stabilization of Mechanical Systems with Symmetry, preprint.
43. Lynch, C., and D.V. Zenkov [2012] Stability of Relative Equilibria of Discrete Nonholonomic Systems, preprint.
44. Ball, K.R., and D.V. Zenkov [2013] Hamel's Formalism and Variational Integrators, preprint.
45. Fernandez, O.E., A.M. Bloch, and D.V. Zenkov [2013] The Geometry and Integrability of the Suslov Problem, preprint.
46. Zenkov, D.V., M. Leok, and A.M. Bloch [2013] The Discrete Hamel's Formalism and Energy-Momentum Integrators for the n -dimensional Spherical Pendulum, preprint.

Editorial

2009–2012 The Journal of Nonlinear Science
 2010– SIAM Journal on Control and Optimization
 2011– Journal of Geometric Mechanics

Invited Talks

Workshop on Nonholonomic Mechanics, UC Berkeley, Berkeley, CA, August 1994
 Symposium on Current and Future Directions in Applied Mathematics, Notre Dame, IN, April 1996
 The Conference in Honor of Vladimir Arnold, Toronto, Canada, June 1997 (Invited Poster)
 CDS Seminar, Caltech, Pasadena, CA, October 1997
 104th Annual Meeting of the American Mathematical Society, Baltimore, MD, January 1998
 39th IEEE Conference on Decision and Control, Sydney, Australia, December 2000
 NCSU Differential Equations Seminar, Raleigh, NC, February 2001
 Western Michigan University, Colloquium, April 2001
 6th SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2001
 5th SIAM Conference on Control and its Applications, San Diego, NC, July 2001
 UNC Applied Math Seminar, Chapel Hill, NC, April 2002
 American Control Conference, Anchorage, AK, May 2002
 4th International Conference on Dynamical Systems and Differential Equations, Wilmington, NC, May 2002
 MTNS, Notre Dame, IN, August 2002
 Tulane University, New Orleans, LA, Colloquium, April 2003
 7th SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2003
 APM, St. Petersburg, Russia, June 2003
 5th ICIAM, Sydney, Australia, July 2003
 42nd IEEE Conference on Decision and Control, Maui, Hawaii, December 2003

WPI, Worcester, MA, Colloquium, April 2004
 5th International Conference on Dynamical Systems and Differential Equations, Pomona, CA, June 2004
 University of Michigan Applied Mathematics Seminar, Ann Arbor, MI, October 2004
 WPI, Worcester, MA, Colloquium, November 2004
 Research Thematic Trimester on Control, Geometry and Engineering, Invited Lecture, CRM, Barcelona, February 2005
 8th SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2005
 AMS National Meeting, San Antonio, TX, January 2006
 XXIst International Workshop on Differential-Geometric Methods in Theoretical Mechanics (Satellite ICM Conference), Madrid, Spain, September 2006
 45th IEEE Conference on Decision and Control, San Diego, CA, December 2006
 Numerical Integration of Nonholonomic Systems, Invited Lecture, Madrid, Spain, December 2006
 Nonholonomic Dynamics and Integrability, Invited Lecture, BIRS, Banff, Canada, January 2007
 9th SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2007
 6th ICIAM, Zürich, Switzerland, July 2007
 College of Charleston, Charleston, SC, Colloquium, September 2007
 7th International Conference on Dynamical Systems, Differential Equations, and Applications, Arlington, TX, May 2008
 Xth Pyatnitskiy International Workshop on Stability and Oscillations of Nonlinear Control Systems, Moscow, Russia, June 2008
 AMS Sectional Meeting, Huntsville, AL, October 2008
 Applied and Computational Mathematics Seminar, Purdue University, IN, February 2009
 AMS Sectional Meeting, Raleigh, NC, April 2009 (two talks)
 10th SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2009
 SIAM Conference on Control and its Applications, Denver, CO, July 2009
 AMS Sectional Meeting, University Park, PA, October 2009
 48th IEEE Conference on Decision and Control, Shanghai, China, December 2009
 UNC Applied Math Seminar, Chapel Hill, NC, February 2010
 SIAM–SEAS, Raleigh, NC, March 2010
 6th Annual Structured Integrators Workshop, La Jolla, CA, April 2010
 3rd International Conference on Dynamics, Vibration, and Control, Hangzhou, China, May 2010
 Department of Mathematics, Beijing Institute of Technology, Beijing, China, May 2010
 8th International Conference on Dynamical Systems and Differential Equations, Dresden, Germany, May 2010
 XIth Pyatnitskiy International Workshop on Stability and Oscillations of Nonlinear Control Systems, Moscow, Russia, June 2010
 Canadian Applied and Industrial Mathematics Society Annual Meeting, St. John's, Canada, July 2010
 AMS Sectional Meeting, Richmond, VA, November 2010
 AMS Sectional Meeting, Statesboro, GA, March 2011
 Georgia Southern University, Statesboro, GA, Colloquium, March 2011
 SIAM–SEAS, Charlotte, NC, March 2011
 11th SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2011
 Mathematisches Forschungsinstitut Oberwolfach, Germany, August 2011 (Invited lecture)
 Department of Mathematics, Beijing Institute of Technology, Beijing, China, September 2011 (a series of 5 lectures)
 Qingdao University, Qingdao, China, September 2011 (Invited lecture)
 Moscow State University, Moscow, Russia, October 2011 (Invited seminar)

Tulane University, New Orleans, LA, February 2012 (Colloquium)
 XIIth Pyatnitskiy International Workshop on Stability and Oscillations of Nonlinear Control Systems, Moscow, Russia, June 2012
 Department of Mathematics, Beijing Institute of Technology, Beijing, China, June 2012
 6th International Conference on Recent Advances in Applied Dynamical Systems, Guangzhou, China, June 2012 (Invited talk)
 9th International Conference on Dynamical Systems and Differential Equations, Orlando, FL, July 2012
 The Fields Institute, Toronto, Canada, July 2012 (invited lecture)
 Ostrava University, Ostrava, Czech Republic, August 2012 (invited lecture)
 17th Summer School on Global Analysis and Applications, Levoca, Slovakia, August 2012 (a series of 4 lectures)
 Variation on a Theme, Levoca, Slovakia, August 2012 (invited talk)
 University of Padova, Padova, Italy, August 2012 (invited lecture)
 IFAC Workshop on Lagrangian and Hamiltonian Methods in Nonlinear Control, Bertinoro, Italy, August 2012, invited session talk
 University of Alberta, Edmonton, Canada, November 2012 (Invited seminar)
 51st IEEE Conference on Decision and Control, Maui, Hawaii, December 2012
 Ostrava University, Ostrava, Czech Republic, February 2013 (invited lecture)
 12th SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2013

Reviewer for

NSF, Automatica, Dynamical Systems, International Journal of Control, Journal of the Franklin Institute, Journal of Nonlinear Science, Journal of Physics A, Proceedings A, Physics Letters, SIAM Journal on Applied Dynamical Systems, the International Journal for Computation and Mathematics in Electrical and Electronic Engineering, Transaction of Automatic Control, Systems and Control Letters, Physica D, Applied Numerical Mathematics, SIAM Journal On Control and Optimization, Discrete and Continuous Dynamical Systems

Conference Organization

Michigan Interdisciplinary Mathematical Meeting II, Ann Arbor, May 1999
 Invited session “Constrained Dynamics”, 6th SIAM Conference on Applications of Dynamical Systems, 2001
 Invited sessions “Nonholonomic Dynamics and Control” and “Nonholonomic Mechanics and Robotics”, SIAM Control Conference, 2001
 Invited Session “Geometric Methods in Control”, ACC 2002
 Invited Session “Geometric Methods in Dynamical Systems”, 4th International Conference on Dynamical Systems and Differential Equations, 2002
 Invited Session “Geometric Dynamics”, 7th SIAM Conference on Applications of Dynamical Systems, 2003
 Invited Session “Dynamics and Control of Nonlinear Systems”, 42nd CDC, 2003
 Invited Session “Geometric Dynamics and Applications”, 5th International Conference on Dynamical Systems and Differential Equations, 2004
 Invited Session “Geometric Dynamics and its Applications”, 8th SIAM Conference on Applications of Dynamical Systems, 2005
 Invited Session “Contemporary Dynamical Systems”, AMS National Meeting, 2006
 Invited Session “Nonlinear Dynamics and Control of Mechanical Systems”, 45nd CDC, 2006
 Invited Session “Geometric Methods in Dynamical Systems”, 9th SIAM Conference on Applications of Dynamical Systems, 2007
 Invited Session “Geometry, Dynamics, and Control”, 6th ICIAM, July 2007
 Invited Session “Geometric Mechanics, Control, and Integrability”, AMS Sectional meeting, Huntsville, AL, October 2008
 Invited Session “Nonlinear Dynamics and Control”, AMS Sectional meeting, Raleigh, NC, April 2009

Invited Session “Geometric Methods in Dynamics”, 10th SIAM Conference on Applications of Dynamical Systems, May 2009

Invited Session “Dynamics and Control of Mechanical Systems and Fluids”, SIAM–SEAS, Raleigh, NC, March 2010

Invited Session “Dynamics and Control of Mechanical Systems and Fluids”, SIAM–SEAS, Charlotte, NC, March 2011

Invited Session “Symmetry in Variational Problems and Differential Equations”, 11th SIAM Conference on Applications of Dynamical Systems, May 2011

Invited Session “Variational Principles”, 12th SIAM Conference on Applications of Dynamical Systems, May 2013