

Curriculum Vitae (May 2014)

Lennard F. Bakker

Education

- Ph.D. (Mathematics) Queen's University, Canada, May 1997. Thesis Title: Brake Orbits and Magnetic Twistings in Two Degrees of Freedom Hamiltonian Dynamical Systems. Thesis Supervisor: Daniel C. Offin.
- M.Sc. (Mathematics) University of Victoria, Canada, November 1993. Thesis Title: Arnold Diffusion in the Elliptic Restricted Three-Body Problem. Thesis Supervisor: Florin N. Diacu.
- B.Sc.(Hons) (Mathematics) University of Victoria, Canada, May 1991. Graduated with First Class Standing.

Employment History

- Associate Professor, Brigham Young University, Sept. 2010 - present.
- Assistant Professor, Brigham Young University, Sept. 2002 - Aug. 2010.
- Visiting Assistant Professor, Franklin and Marshall College, July 2001-June 2002.
- Visiting Assistant Professor, Brigham Young University, August 1999-August 2001.
- Visiting Lecturer, University of Nevada, Reno, August 1998-June 1999.
- Sessional Instructor, Simon Fraser University, January-April 1998.
- Research Associate, Queen's University, May-October 1997.

Courses Taught At BYU Since Fall 2002

- Math 113 Calculus II
- Math 290 Fundamentals of Mathematics
- Math 302 Mathematics for Engineering I
- Math 303 Mathematics for Engineering II
- Math 313 Linear Algebra with Applications
- Math 314 Calculus of Several Variables
- Math 334 Ordinary Differential Equations
- Math 341 Theory of Analysis I

- Math 495R Readings in Mathematics
- Math 547 Partial Differential Equations
- Math 634 Theory of Ordinary Differential Equations
- Math 635 Dynamical Systems
- Math 641 Functions of a Real Variable
- Math 643R Special Topics in Analysis
- Math 695R Readings in Mathematics

Peer-Reviewed Publications

- Bakker, L.F., and Simmons, S.C., Stability of the Rhomboidal Symmetric-Mass Orbit, to appear in *Dis. Con. Dyn. Sys. A* (accepted Feb. 2014, submitted Aug. 2013).
- Bakker, L.F., Understanding the Dynamics of Collision and Near-Collision Motions in the N -Body Problem, in *Advances in Interdisciplinary Mathematical Research Vol. 37 of Springer Proceedings of Mathematics and Statistics*, Springer (2013), 99-116.
- Bakker, L.F., The Katok-Spatzier Conjecture, Generalized Symmetries, and Equilibrium Free Flows, *Communications on Pure and Applied Analysis*, Vol. 12, No. 3 (2013), 1183-1200.
- Bakker, L.F., Ouyang, T., Yan, D., Simmons, S., Errata to: Existence and Stability of Symmetric Periodic Simultaneous Binary Collision Orbits in the Pairwise-Symmetric Planar Four-Body Problem, *Celestial Mechanics and Dynamical Astronomy*, Vol. 112 (2012), 459-460.
- Bakker, L.F., Mancuso, S.C., Simmons, S.C., Linear Stability Analysis of Symmetric Periodic Simultaneous Binary Collision Orbits in the Planar Pairwise Symmetric Four-Body Problem, *Journal on Mathematical Analysis and Applications*, Vol. 392 (2012), 136-147.
- Bakker, L.F., Martins Rodrigues, P., A Profinite Group Invariant for Hyperbolic Toral Automorphisms, *Discrete and Continuous Dynamical Systems A*, Vol. 32, No. 6 (2012), 1965-1976.
- Bakker, L.F., Ouyang, T., Yan, D., Simmons, S., Existence and Stability of Symmetric Periodic Simultaneous Binary Collision Orbits in the Pairwise-Symmetric Planar Four-Body Problem, *Celestial Mechanics and Dynamical Astronomy*, Vol. 110 (2011), 271-290.

- Bakker, L.F., Ouyang, T., Yan, D., Simmons, S., Roberts, G., Linear Stability for Some Symmetric Periodic Simultaneous Binary Collision Orbits in the Four-Body Problem, *Celestial Mechanics and Dynamical Astronomy*, Vol. 108, No. 2 (2010), 147-164.
- Bakker, L.F., and Whitehead, J., Asymptotic Values, Prepoles, and Periodic Points, *International Journal of Bifurcation and Chaos*, Vol. 20, No. 4 (2010), 1049-1059.
- Bakker, L.F., Measurably Nonconjugate Higher Rank Abelian NonCartan Actions, *Proceedings of Dynamic Systems and Applications*, Vol. 5 (2008), 53-59.
- Bakker, L.F., Rigidity of Projective Conjugacy for Quasiperiodic Flows of Koch Type, *Colloquium Mathematicum*, Vol. 112, No. 2 (2008), 291-312.
- Bakker, L.F., Semiconjugacy of Quasiperiodic Flows and Finite Index Subgroups of Multiplier Groups, in “Dynamical Systems and Differential Equations,” (eds. S. Hu, X. Lu, and W. Xie), *Discrete and Continuous Dynamical Systems, Supplement* (2005), 60-69.
- Bakker, L.F., Quasiperiodic Flows and Algebraic Number Fields, *Proceedings of Dynamic Systems and Applications*, Vol. 4 (eds. G.S. Ladde, N.G. Medhin, and M. Sambandham), *Dynamic Publishers, Inc.* (2004), 46-52.
- Bakker, L.F., Structure of Group Invariants of a Quasiperiodic Flow, *Electronic Journal of Differential Equations*, Vol. 2004 No. 39 (2004), 1-14.
- Bakker, L.F. and Conner, G.R., A Class of Generalized Symmetries of Smooth Flows, *Communications on Pure and Applied Analysis*, Vol. 3, No. 2 (2004) 183-195.
- Bakker, L.F. A Reducible Representation of the Generalized Symmetry Group of a Quasiperiodic Flow, in “Dynamical Systems and Differential Equation,” (eds. W. Feng, S. Hu, and X. Lu), *Discrete and Continuous Dynamical Systems, Supplement* (2003), 68-77.
- Bakker, L.F., One-Parameter Families of Brake Orbits in Dynamical Systems, *Colloquium Mathematicum*, Vol. 82 No.2 (1999), 201-217.
- Bakker, L.F. and Diacu, F.N., On the Existence of Celestial Bodies with Unpredictable Motion in the Solar System and in the Kirkwood Gaps, *Romanian Astronomical Journal*, Vol. 3 No. 2, Editura Academiei Romane (1993), 139-155.

Preprints

- Bakker, L.F., Fisher, T., Open Sets of Diffeomorphisms with Trivial Centralizer in the C^1 Topology, posted on ArXiv 1405.1492, submitted to *Nonlinearity*, May 2014.

- Bakker, L.F., Martins Rodrigues, P., A Profinite Group Invariant for Hyperbolic Toral Automorphisms II, in progress.
- Bakker, L.F., Simmons, S.C., The Restricted Rhomboidal Problem, in progress.
- Bakker, L.F., Simmons, S.C., Hoggan, E., Symbolic Dynamics for Collisions in the Rhomboidal Symmetric-Mass Problem, in progress.
- Bakker, L.F., Reinterpretation of the Levi-Civita Regularization of Collisions in Collinear N -body Problems in terms of Real Algebraic Geometry, in progress.

Invited Presentations

- The Rhomboidal Symmetric-Mass Problem, in the special session “Celestial Mechanics” as the AMS National Conference, San Diego, Jan. 2013.
- The Rhomboidal Symmetric-Mass Problem, in the special session “Celestial Mechanics” at the CMS Winter Meeting, Montreal, Canada, December 2012.
- Understanding the Dynamics of Collision and Near-Collisions Motions in the N -Body Problem, Spring Series of the Mathematical Sciences and Applications Seminar, College of Engineering, Science and Technology, Department of Mathematics, Virginia State University, April 2012.
- Reinterpretation of the Levi-Civita Regularization of Collisions in Collinear N -body Problems in terms of Real Algebraic Geometry, in the special session “Celestial and Geometric Mechanics” at the Western Sectional AMS Meeting, University of Utah, Salt Lake City UT, October, 2011.
- Reinterpretation of the Levi-Civita Regularization of Collisions in Collinear N -body Problems in terms of Real Algebraic Geometry, in Mini-symposium “Algebraic Geometry Applied to Celestial Mechanics” at the SIAM Conference on Algebraic Geometry, North Carolina State University, Raleigh NC, October 2011.
- Existence and Stability of Symmetric Periodic Simultaneous Binary Collision Orbits in the Pairwise-Symmetric Planar Four-Body Problem, in the special session “Methods in Nonlinear Dynamics” at the CMS Winter Meeting, Vancouver, Canada, December 2010.
- Existence and Stability of Symmetric Periodic Simultaneous Binary Collision Orbits in the Pairwise-Symmetric Planar Four-Body Problem, in the special session “Differential Equations and Applications to Physics and Biology” at the AMS Fall Southeastern Section Meeting, Richmond, VA, November 2010.
- Linear Stability for Some Symmetric Periodic Simultaneous Binary Collision Orbits in the Four-Body Problem, in the special session “Dynamical System” at the Second Joint CMS/SMM Meeting, Vancouver, Canada, August 2009.

- Linear Stability for Some Symmetric Periodic Simultaneous Binary Collision Orbits in the Four-Body Problem, Special Session on “Research in Applied Mathematics” at the MAA Sectional Meeting at Brigham Young University, March 2009.
- Linear Stability for Some Symmetric Periodic Simultaneous Binary Collision Orbits in the Four-Body Problem, Theoretical Physics Group at Brigham Young University, Feb. 2009.
- The topological conjugacy problem for torus automorphisms, IST, Lisbon, Portugal, June 2008.
- The Katok-Spatzier Conjecture and Generalized Symmetries, in the session “Algebraic Dynamics,” at the AMS National Conference, San Diego, Jan. 2008.
- Measurably Nonconjugate Higher Rank Abelian NonCartan Actions, in the session “Dynamical Systems and Applications,” at the Fifth International Conference on Dynamic Systems and Applications, Morehouse College, Atlanta, GA, May 2007.
- Semiconjugacy of Quasiperiodic Flows and Finite Index Subgroups of Multiplier Groups, in the special session “Application of Algebraic Methods in Dynamical Systems,” at the Fifth International Conference on Dynamical Systems and Differential Equations, California State Polytechnic University, Pomona, CA, June 2004.
- Quasiperiodic Flows and Algebraic Number Fields, in the session “Dynamical Systems and Applications,” at the Fourth International Conference on Dynamic Systems and Applications, Morehouse College, Atlanta, GA, May 2003.
- A Reducible Representation of the Generalized Symmetry Group of a Quasiperiodic Flow, in the special session “Symmetries and Differential Equations in Physics and Other Applications,” at the Fourth International Conference on Dynamical Systems and Differential Equations, University of North Carolina, Wilmington, NC, May 2002.
- Representations of Group Invariants of the Conjugacy Class of a Flow, Midwest Dynamical Systems Seminar, Northwestern University, Evanston, IL, March 2001.

Invited Proxy Presentations

- Infinite Multiplicity of Positive Solutions for Singular Nonlinear Elliptic Equations with Convection Term and Related Supercritical Problems, presented in behalf and by request of Carlos Aranda (and Jesus Hernandez) at the 8th Mississippi State - UAB Conference on Differential Equations and Computational Simulations, May 2009.
- Second Order Dynamical Systems used for Generating “Practical” Test Functions for Filtering and Sampling Procedures, presented in behalf and by request of Christian Toma, Politehnica University, Bucharest, Romania, in the special session

“Symmetries and Differential Equations in Physics and Other Applications,” at the Fourth International Conference on Dynamical Systems and Differential Equations, University of North Carolina, Wilmington, NC, May 2002.

Contributed Presentations

- Open sets of Diffeomorphisms with Trivial Centralizer in the C^1 Topology, Spring Meeting of the Intermountain Section of The Mathematical Association of America, Utah Valley University, Orem UT, March 2014.
- The Rhomboidal Symmetric-Mass Problem, SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2013.
- Linear Stability Analysis of Symmetric Periodic Simultaneous Binary Collision Orbits in the Planar Pairwise Symmetric Four-Body Problem, SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2011.
- Linear Stability for Some Symmetric Periodic Simultaneous Binary Collision Orbits in the Four-Body Problem, at the 8th Mississippi State - UAB Conference on Differential Equations and Computational Simulations, May 2009.
- The Multiplier Group of a Quasiperiodic Flow, at the Canadian Mathematical Society Winter Conference, Dec. 2005, Victoria, BC.

Graduate Students Supervised

- Skyler C. Simmons, Winter 2012 through present, working with Celestial Mechanics research group on existence and stability of periodic solutions in Hamiltonian systems.

Undergraduate Students Supervised

- Alex Safsten, Winter 2014 (April) to present, working with Celestial Mechanics research group.
- Brynne Hansen, Spring 2013, working with Celestial Mechanics research group.
- Chace Ashcraft, Fall 2012 to present, working with Celestial Mechanics research group.
- Emma Hogan, Winter 2012, Fall 2012, working with Celestial Mechanics research group in symbolic dynamics of binary collisions in the rhomboidal four-body problem.
- Scott Mancuso, Fall 2010-Winter 2011, worked with the Celestial Mechanics research group on linear stability of simultaneous binary collision orbits in the four-body problem.

- Nanzhu Zhao, Fall 2009-Winter 2010, worked with the Celestial Mechanics research group on periodic orbits in the spatial three, four, and five-body problems, a graduate student at the University of Texas, Austin.
- Steven Flygare, Winter 2009, worked with the Celestial Mechanics research group on problems in the collinear three-body problem, a graduate student at the University of Utah beginning Fall 2009.
- Jared Whitehead, Fall 2003-Winter 2006, undergraduate honor thesis, Topological Bifurcations of Julia Sets (March 2006), graduated with a Ph.D. in mathematics at the University of Michigan Fall 2011.

University Service and Citizenship

- Chair of Contributed Paper Session #28 at SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2013.
- Reviewer for Zentralblatt Math. (Accepted invitation in December 2012.)
- Math 302/303 Coordinator, Fall 2012 to present.
- Director of Non-Major Advisement and member of Undergraduate Committee, Winter 2011 to August 2013.
- Co-organizer with Tiancheng Ouyang of special session “Celestial and Geometric Mechanics” at American Mathematical Society’s Fall Western Sectional Meeting at the University of Utah, October 2011.
- Member of Planning Committee, Department of Mathematics, Winter 2011 to Winter 2012.
- Member of the Teaching Committee, Department of Mathematics, in charge of new TA training, Fall 2008 to Winter 2011.
- Member of the Undergraduate Committee, Department of Mathematics, as a Math Advisor, Fall 2008 to Winter 2011.
- Reviewer for Mathematical Reviews. (Accepted invitation to be a reviewer in August 2008.)
- Co-organizer (along with Todd Fisher, Kening Lu, and Dan Rudolph) of Rocky Mountain Dynamical Systems Conference, Park City, UT, May 2008. (Funded by NSF grant 0800840)
- Co-organizer (along with Diana Thomas and Donald Mills) for the special session “Algebraic Dynamics” at the National Meeting of the American Mathematical Society, San Diego, Jan. 2008.

- Member of Graduate Committee as author and grader of Ph.D. Qualifier Exam in Analysis, Spring 2012, Winter 2012, Fall 2011, Spring 2011, Winter 2011, Fall 2009, Spring 2009, Fall 2006, Winter 2005, Fall 2004.
- Organizer of the special session “Applications of Algebraic Methods in Dynamical Systems,” at the Fifth International Conference on Dynamical Systems and Differential Equations, California State Polytechnic University, Pomona, CA, June 2004.
- Full Participation in the Faculty Development Series, Faculty Center, Brigham Young University, September 2002-March 2004.
- Judge at the Central Utah Science and Engineering Fair, Brigham Young University, March 2014, March 2013, March 2012, March 2011, March 2009, March 2008, March 2007, March 2006, March 2005, March 2004, April 2003, March 2001, March 2000.
- Chair of the first day of presentations in the several-day session on Dynamical Systems and Applications at the Fourth International Conference on Dynamic Systems and Applications, Morehouse College, Atlanta, May 2003.
- Judge in the mathematics category of the 2002-2003 Northeast Utah Region Sterling Scholar Competition.
- Member of the Utah State Math Contest committee, Brigham Young University, with responsibility for the preparation of the 2001 senior test.
- Academic Advisor for BYUSA Kicks Club, Brigham Young University, 2000-2001. The Kicks Club is devoted to the art of field goal kicking - personal best 45 yards.