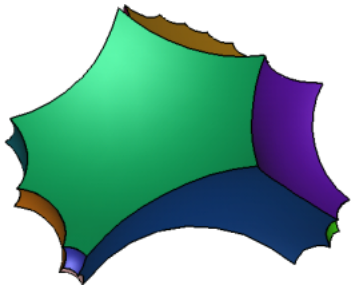
Roland K. W. Roeder



Personal Information

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U.S. citizen, born 03/09/1978 in San Diego, California

Employment

8/2006-7/2008	Postdoctoral fellow, Department of Mathematics, University of Toronto.
8/2005-7/2006	Jerrold E. Marsden Postdoctoral Fellow, Fields Institute, University of Toronto.

Education

8/2005	Ph.D. Cornell University, Thesis title: *Topology for the basins of attraction of Newton's Method in two complex variables*. Thesis Adviser: John H. Hubbard.
5/2004	Docteur de l'Université de Provence, Thesis title: *Andreev's Theorem on Hyperbolic Polyhedra*. Thesis Adviser: John H. Hubbard.
6/2000	BA in Mathematics, Summa Cum Laude, University of California, San Diego.

Research Interests

Hyperbolic Geometry,

Complex Dynamics in Several Variables, and

Applications of dynamical systems theory to tokamak physics and to statistical physics.

Awards

December 2004	Robert John Battig Graduate Prize in mathematics. Department of Mathematics, Cornell University.
September 2004	Mentioned in an article about the use of computers in mathematics in the French popular Science magazine *Sciences et Avenir*, September 2004 issue.
2003-2004	NSF Integrative Graduate Research and Training Fellowship
2000-2003	National Defense Science and Engineering Graduate Fellowship.
1998-2000	Barry M. Goldwater Scholarship.

Publications and Papers

In preparation:

Pavel Bleher, Mikhail Lyubich, and Roland K. W. Roeder. *Complex dynamics for the Yang-Lee zeros*

Suzanne Lynch Hruska and Roland K. W. Roeder. *Topology of Fatou components for polynomial skew products of* $\mathbb{P}^2$.

Published or accepted for publication:

Omar Antolín-Camarena, Gregory R. Maloney, and Roland K. W. Roeder. *Computing arithmetic invariants for hyperbolic reflection groups* Conditionally accepted to appear in a volume celebrating John Hubbard's 60th birthday. Preprint available at: arXiv:0708.2109

Roland K. W. Roeder. *Constructing hyperbolic polyhedra using Newton's Method.* Experimental Mathematics, 16(4): 463-492, 2007.

Roland K. W. Roeder. *A degenerate Newton's map in two complex variables: linking with currents.* J. Geometric Analysis, 17(1):107–146, 2007.

Roland K. W. Roeder John H. Hubbard and William D. Dunbar. *Andreev's theorem on hyperbolic polyhedra.* Les Annales de l'Institute Fourier, 57(3):825–882, 2007.

Roland K. W. Roeder *Compact hyperbolic tetrahedra with non-obtuse dihedral angles* Publicacions Matemàtiques, 50 (1): 211-227, 2006 .

T.E. Evans, R.K.W. Roeder, J.A. Carter, and B.I. Rapoport. *Homoclinic tangles, bifurcations and edge stochasticity in diverted tokamaks.* Contributions to Plasma Physics, 44 (1-3): 235–240, 2004.

R. K. W. Roeder, B. I. Rapoport, and T. E. Evans. *Explicit calculations of homoclinic tangles in tokamaks.* Phys. Plasmas, 10 (9): 3796–3799, 2003.

Roland K. W. Roeder. *On Poincaré's fourth and fifth examples of limit cycles at infinity.* Rocky Mountain J. Math., 33 (3): 1057–1082, 2003.

Book contributions:

Chapter 14, titled: "Andreev's Theorem" in:
Teichmüller Theory and Applications to Geometry, Topology, and Dynamics. Volume II: Four Theorems by William Thurston by John H. Hubbard
with contributions by Adrien Douady, William Dunbar, and **Roland Roeder**, as well as Sylvain Bonnot, David Brown, Allen Hatcher, Chris Hruska, and Sudeb Mitra,
Matrix Editions (in preparation).

Teichmüller Theory and Applications to Geometry, Topology, and Dynamics. Volume I: Teichmüller Theory John H. Hubbard
with contributions by Adrien Douady, William Dunbar, and **Roland Roeder**, as well as Sylvain Bonnot, David Brown, Allen Hatcher, Chris Hruska, and Sudeb Mitra, Matrix Editions (2006).

Non-refereed papers:

T.E. Evans, R.K.W. Roeder, J.A. Carter et al. *Experimental signatures of homoclinic tangles in poloidally diverted tokamaks.* Journal of Physics: Conference Series, 7: 174-190, 2005.

Mahaffy, J., Polk, S. W., Roeder, R. K. W. *An age-structured model for erythropoiesis following a phlebotomy.* Centre de Recherch Mathématiques: CRM-2598, 1999.

Mathematical Software

(1) Omar Antolín-Camarena, Gregory R. Maloney, and Roland K. W. Roeder. SNAPHEDRON: a computer program for computing arithmetic invariants of polyhedral reflection groups (written in PARI/GP). `http://www.math.toronto.edu/~rroeder/SNAP-HEDRON`.

(2) Roland K. W. Roeder HYPER-HEDRON: computer scripts for constructing compact hyperbolic polyhedra (written in Matlab.) `http://www.math.toronto.edu/~rroeder/HYPER-HEDRON`.

(3) Dynamical systems software for analysis of tokamak magnetic fields, written for General Atomics, San Diego under Contract number CA #3767.

Selected Talks

Conference Presentations

January 2008 — Young Mathematicians' Conference, CRM Montreal.
Complex Dynamics for the Yang-Lee zeros.

May 2007 — Conformal dynamics section of the joint AMS-SMM conference in Zacatecas Mexico.
Computing invariant trace fields for polyhedral reflection groups, starting with floating point data.

May 2006 — Hyperbolic geometry workshop, Fields Institute
Andreev's Theorem on Hyperbolic Polyhedra

June 2005 — Dynamique conforme, géométrie hyperbolique, et fractions continues, CIRM, Marseille France.
Newton's method in C^2: an example of overcoming the exceptional divisors in order to compute linking numbers

May 2005 — Ahlfors-Bers Colloquium, Ann Arbor Michigan
Andreev's Theorem on Hyperbolic Polyhedra

May 2004 — Mini colloque: Géométrie et topologie en basse dimension, Centre de Mathématiques et Informatique; Marseille France.
Compact hyperbolic tetrahedra

September 2003 — Holomorphic Surgery conference, Institut Henri Poincaré; Paris France.
Andreev's Theorem on hyperbolic polyhedra

Department Colloquia

Feb 2008 — Indiana University Purdue University Indianapolis (IUPUI), Feb 22, 2008.
Complex Dynamics for the Yang-Lee zeros.

Oct 2006 — Warwick University, Oct 27, 2006.
Combinatorial aspects of Andreev's classification of hyperbolic polyhedra.

Invited Seminar Talks

Feb 2008 — Dynamical systems seminar, IUPUI

Feb 2008 — PDE, complex analysis and geometry seminar, Notre Dame University

April 2007 — Dynamical systems seminar, Queens University

April 2007 — Dynamical systems seminar, SUNY Stony Brook

Nov 2006 — Dynamical systems seminar, at Centre de Mathématiques et Informatique; Marseille France

Oct 2006 — Dynamical systems seminar, at U. Liverpool.

Aug 2006 — Ukranian-Canadian summerschool in dynamical systems, at U. Toronto.

May 2006 — Seminar Ecole Normal Superior-Lyon.

January 2006 — Geometry seminar; York University.

Nov 2005 — Dynamical systems seminar, SUNY Stony Brook.

Sept 2005 — Dynamical systems Mini-course, Fields Institute.

March 2004	Institut de Mathématiques de LUMINY; Marseille France.
August 2001	Special seminar, General Atomics D-IIID fusion group.

Teaching

Fall 2004, Cornell Math 111, Introductory Calculus, part 1.

Spring 2005, Cornell Math 112, Introductory Calculus, part 2.

Spring 2007, Toronto Math 402, Classical Geometries (developed the course myself).

Spring 2007, Toronto Math 223, Linear Algebra.

Fall 2007, Toronto Math 389, Complex Variables for engineers (developing the course myself.)

Service

2006-present	Co-organizer for the Dynamical Systems Seminar at the University of Toronto.
2006-present	I have refereed papers for *Nonlinearity*, *Experimental Mathematics*, and for the Proceedings of the 2005-2006 thematic year at the Fields Institute.
2005-2006	Co-organizer for the Dynamical Systems Seminar and Dynamical Systems mini-courses for the Thematic Year at the Fields Institute.
2004-2005	Co-organizer for the "Olivetti Club" graduate student seminar at Cornell University.

References

John Hubbard, Cornell University, `jhh8@cornell.edu`

Mikhail Lyubich, University of Toronto, `misha@math.toronto.edu`

John Smillie, Cornell University, `jds28@cornell.edu`

Todd Evans, General Atomics, DIII-D fusion group, San Diego, `evans@fusion.gat.com`

Mike Lorimer, University of Toronto (teaching reference), `lorimer@math.toronto.edu`

Toronto, 4 March 2008