

SHUGUANG WANG  
CURRICULUM VITAE

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Professor, Department of Mathematics  
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**RESEARCH INTERESTS**

Differential Geometry and related areas (Gauge theoretic topological invariants including Donaldson & Seiberg-Witten invariants; Foliations; Real algebraic geometry; Symplectic/contact geometry)

**EDUCATION**

DPhil, 1986-90    Oxford University, England, UK  
Thesis Title: Gauge Theory and Involutions  
Thesis Supervisor: Simon K. Donaldson

BA, 1979-83    Sichuan University, Chengdu, China  
Major: Mathematics

**ACADEMIC APPOINTMENTS and EXPERIENCES**

1992-Present    **University of Missouri**  
Professor of Mathematics (since 2009)  
Associate Professor (1998)  
Assistant Professor (1992)

2013-2016    **National Science Foundation**  
Program Director, Topology and Geometric Analysis programs

2008    **I.H.E.S.**, Bures-sur-Yvette, France  
Institute Member (August)

1996 & 2004    **M.S.R.I.**, Berkeley, California,  
General Membership (January 1996 & January – May 2004)

1990-1992    **Michigan State University**  
Research Instructor (Postdoc)

1985-1986    **Nankai Institute of Mathematics**, Tianjin, China  
Research Associate in residence

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(Cont. from **ACADEMIC APPOINTMENTS and EXPERIENCES**)

1983-1985     **Xi'an Jiao-tong University**, Xi'an, China.  
 Instructor/Assistant Professor

## **RESEARCH**

### **Competitive Grant Received**

#### *External:*

Membership at Institut des Hautes Etudes Scientifiques (IHES), France, 2008 (\$2,300)  
 N.S.F. Grant, 2002-2005 (\$88,706)  
 General Membership at M.S.R.I., Berkeley, California, 2004 (\$10,360)  
 Membership at M.S.R.I., Berkeley, California, 1996 (\$4,000)  
 Park City Regional Geometry Institute (funded by N.S.F.), 1991 (\$1,600)

#### *University of Missouri, Columbia Campus (UMC) and System-wide (UM):*

UM Research Board, 2006 (\$7,500)  
 UMC Summer Research Fellowship, 1999 (\$7,000)  
 UM Research Board and UMC Summer Research Fellowship, 1997 (\$12,500)  
 UM Research Board, 1995 (\$10,600)  
 UMC Summer Research Fellowship, 1994 (\$4,000)  
 UM Research Board, 1993 (\$17,500, PI: Jan Segert)}

### **Prize and Award**

Oxford University Overseas Students Award, 1986-1989 (\$9,000)  
 K.C. Wong Education Foundation Scholarship, 1986-1990 (\$52,800)  
 (A national competition in China with two winners only in Mathematics, one for Differential Geometry and the other for Algebraic Number Theory)

### **Publications**

Wang, Shuguang: *A Higher Dimensional Foliated Donaldson Theory, I*, Asian Journal of Mathematics, 19 (2015) 527-554.  
 Wang, Shuguang: *Objective B-fields and a Hitchin-Kobayashi correspondence*, Transactions of the American Mathematical Society, 364 (2012) 2087-2107.  
 Saveliev, Nikolai and Wang, Shuguang: *On real moduli spaces of holomorphic bundles over M-curves*, Topology & Its Applications, 158 (2011) 344-351.  
 Tian, Gang and Wang, Shuguang: *Orientability and real Seiberg-Witten invariants*, International Journal of Mathematics, 20 (2009) 573-604.  
 Wang, Shuguang: *Gerbes, holonomy forms, and real structures*, Communications in Contemporary Mathematics, 11 (2009) 109-130.  
 Li, Weiping and Wang, Shuguang: *Instantons on conic 4-manifolds, the Fredholm theory*, Journal of the Korean Mathematical Society, 44 (2007) 475-496.  
 Wang, Shuguang: *Orientability and spin structures*, JP Journal of Topology and Geometry, 7 (2007) 159-174.  
 Wang, Shuguang: *Twisted complex geometry*, Journal of the Australian Mathematical Society, 80 (2006) 273-196.

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(Cont. from Publications)

Wang, Shuguang: *On orientability and degree of Fredholm maps*, Michigan Mathematical Journal, 53 (2005) 419-428.

Ruan, Yongbin and Wang, Shuguang: *Seiberg-Witten invariants and double covers of 4-manifolds*, Communications in Analysis & Geometry, 8 (2000) 477-515.

Wang, Shuguang: *Branched covers along real parts*, Proceedings of the American Mathematical Society, 125 (1997) 2803-2808.

Wang, Shuguang: *Smooth structures on complex surfaces with fundamental group  $Z_2$* , Proceedings of the American Mathematical Society, 125(1997) 287-292.

Wang, Shuguang: *A Narasimhan-Seshadri-Donaldson correspondence on non-orientable surfaces*, Forum Mathematicum, 8 (1996) 461-474.

Wang, Shuguang: *A vanishing theorem for Seiberg-Witten invariants*, Mathematical Research Letters, 2 (1995) 305-311.

Wang, Shuguang: *Classification of real moduli spaces over genus-2 curves*, Geometrie Dedicata, 57 (1995) 207-215.

Wang, Shuguang: *On quotients of Real algebraic surfaces in  $CP^3$* , Topology & Its Applications, 67 (1995) 53-62.

Wang, Shuguang: *Moduli spaces over manifolds with involutions*, Mathematische Annalen, 296 (1993) 119-138.

Wang, Shuguang: *Yang-Mills functional on  $CP_3$* , Proceedings of Chinese Mathematics into the 21st Century, Eds. W.-T. Wu and M.-D. Cheng, Peking University Press, 1991, pp 205-215. (MR # 94c:58023)

Wang, Shuguang: *Fuzzy paths, homotopy and fundamental monoids* (in Chinese), Fuzzy Mathematics, 2 (1986) 7-14.

### Other Selected Conference & Visiting Support

Gauge theory in Fukuoka, Fukuoka, Japan, February 2018; \$2,300.

Symplectic Geometry – Celebrating the work of Simon Donaldson, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, August 2017; \$350.

Differential Geometry at Large, Florence, Italy, August 2016; \$3,100 (funded by NSF IR/D program).

Summer Research Institute on Algebraic Geometry, Salt Lake City, UT, July 2015; \$1,500 (funded by NSF IR/D program).

International workshop on Real Algebraic Geometry, Villa de Leyva, Colombia, July 2014; \$2,300 (funded by NSF IR/D program)

Beijing International Center for Mathematics, Beijing, China, visiting support, 2013; \$900.

Georgia Intern. Topology Conference, Athens, Georgia, NSF partial support via conference organizers, May 24-29, 2009; \$450.

MU travel support in conjunction with a research leave at MSRI, 2004; \$800.

Hong Kong Univ of Science and Technology, Visiting and research collaboration support, 2003; \$3,200.

MU Faculty International Travel fund, 2001; \$1,500.

MU Faculty International Travel Fund, 1997; \$700.

China NSF support for a visit at the Chinese Academy of Science, 1996; \$700.

First International Press Lectures (at Irvine California), 1996; \$380

Georgia Topology conference, 1996; \$400.

MU College of Arts & Science Assistant Professor Travel Fund, 1995; \$300.

Fifth Midwest Geometry Conference (Washington University, St. Louis), 1995; \$250.

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(Cont. from Other Selected Conference & Visiting Support)

Workshop on Donaldson theory at Oklahoma State University, Stillwater, 1994; \$350.

20th Winter Holiday Mathematics Symposium (New Mexico State University, Las Cruces), 1994; \$320.

### **Selected Invited Seminar, Colloquium and Conference Talks**

February 2018, *Gauge theory on foliated and contact*, Gauge theory in Fukuoka, Fukuoka, Japan.

October 2014, *A compactification of the foliated ASD moduli spaces*, seminar talk, McMaster University, Canada.

July 2014, *Seiberg-Witten theory and real structures*, International workshop on Real Algebraic Geometry, Villa de Leyva, Colombia.

June 2013, *A possible foliated Donaldson type invariant*, seminar talk, Beijing International Center of Mathematical Research (BICMR), Beijing University, China.

January 2013, *A higher dimensional Donaldson theory for foliated manifolds*, Joint annual AMS/MAA Conference, Special Session Manifolds with Special Holonomy and Generalized Geometries, San Diego, CA.

September 2011, *Tight/taut foliations and calibration*, AMS Eastern Regional Conference, Special Session invited talk, held at Cornell University.

July 2010, *A generalization of Hitchin-Kobayashi correspondence for twisted bundles*, Institute of Mathematics, Chinese Academy of Sciences, Beijing.

June 2010, *Objective B-fields and twisted stable bundles*, Beijing Intern. Math. Resear. Ctr. (BIMRC), Peking University, Beijing.

May 2010, *Gerbes, objective B-fields and Hermitian-Einstein connections*, Mathematical Institute, Academia Sinica, Taipei.

October 2009, *A Hitchin-Kobayashi correspondence for twisted bundles*, Geometry Seminar, University of Rochester.

October 2008, *Gerbes and twisted HYM connections*, Mathematics Department, Oklahoma State University - Stillwater. Colloquium.

May 2007, *Real gerbes and holonomy forms*, International Geometry and Topology conference, Beijing University, Beijing, China.

November 2005, *Determinant bundles and real Seiberg-Witten theory*, Geometry Seminar, University of Miami, Miami.

June 2005, *Real Seiberg-Witten invariants*, Nanjing International Workshop on Geometry and Analysis, Nanjing, China.

June 2005, *Orientability and degree of Fredholm maps*, Mathematical Institute, Academia Sinica, Taipei, Taiwan.

April 2004, *Orientability and real gauge theory*, M.S.R.I., seminar.

November 2003, *A calculation of some gerbe holonomies*, University of Wisconsin, Madison, Seminar.

June 2002, *Starting from real polynomials*, China East Normal University, Shanghai, Colloquium.

April 2002, *Gauge theory and real structures*, Cornell University, Colloquium.

June 2001, *Geometry of vortices on singular Riemann surfaces*, Mathematical Institute, Chinese Academy of Sciences, Beijing, Seminar.

May 2001, Four-manifold workshop, Oberwolfach Mathematical Institute, Germany.

January 2001, *Applications of  $RO(\mathbb{Z}_2)$ -graded cohomology to gauge theory*, Annual joint AMS and MSA meeting, New Orleans, Special session talk.

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(Cont. from Selected Invited Seminar, Colloquium and Conference Talks)

- August 2000, *Vortices on singular Riemann surfaces*, University of Wisconsin, Madison, seminar.
- March 2000, *On mod 2 index*, Tulane University, seminar.
- May 1999, *Yang-Mills functional on  $CP^3$* , Ohio State University, Columbus, seminar.
- June 1997, *Seiberg-Witten invariants for certain singular spaces*, The First Conference of Young Chinese Mathematicians in North America, held at University of California. Berkeley, CA.
- July 1997, *Seiberg-Witten invariants on smooth double covers*, MSRI, Berkeley, seminar.
- November 1996, *Double covers of 4-manifolds*, Oklahoma State University, Stillwater, seminar.
- June 1996, *Branched covers along real parts*, Georgia Topology conference, Athens, GA.
- May 1996, *Four manifolds as branched covers*, 4-manifolds workshop, Oberwolfach, Germany.
- March 1996, *On Seiberg-Witten solutions*, AMS meeting, special session on Geometry and Cohomology, Iowa City.
- March 1996, *Seiberg-Witten invariants for quotient manifolds*, University of Utah, Salt Lake City, seminar talk.
- January 1996, *Applications of Seiberg-Witten invariants*, Chinese Academy of Sciences, Beijing, China, seminar.
- December 1995, *From real algebraic geometry to Seiberg-Witten invariants*, National Taiwan University, Taipei, Taiwan, colloquium.
- December 1995, *A vanishing theorem for Seiberg-Witten invariants*, Academia Sinica, Taipei, Taiwan, seminar.
- November 1995, *Exotic free involutions on complex surfaces*, AMS meeting, Boston.
- June 1995, *A new vanishing theorem for Seiberg-Witten invariants*, Fifth Midwest Geometry Conference, Washington University, St. Louis.
- April 1995, *Real algebraic geometry and gauge theory*, special workshop: Rudiments of Yang-Mills (organized by the Sun Institute of Mathematics), held at Institute for Advanced Study, Princeton.
- April 1995, *Topics in Seiberg-Witten theory*, George Washington University, Washington D.C., colloquium.
- November 1994, *d-stable bundles on non-orientable Riemann surfaces*, special workshop: Donaldson theory for complex surfaces and related areas, Oklahoma State University, Stillwater.
- January 1994, *Quotients of Real 4-manifolds*, 20th Winter Holiday Mathematics Symposium, New Mexico State University, Las Cruces.
- June 1993, Park City Institute for Advanced Mathematics Study, Park City.
- December 1992, *Moduli spaces over manifolds with involutions*, McMaster University, Hamilton, Canada, colloquium.
- December 1991, *Singular connections in gauge theory*, University of Missouri, Columbia, colloquium.
- September 1991, *Real structures and some possible new invariants from gauge theory*, Topologie Conference, Oberwolfach, Germany.
- July 1991, *Gauge theory and real structures*, University of California, Berkeley, seminar.
- June 1991, *Some open problems in gauge theory*, Regional Geometry Institute, Park City.
- February 1991, *Gauge theory and involutions*, Tulane University, seminar.

## **TEACHING**

### **Graduate Students Supervised/dissertation (project) titles**

Andrew Renner (2016, Ph.D.) *A foliated Seiberg-Witten theory.*

Jaewon Lee (2009, Ph.D.) *Seiberg-Witten invariants on 3-manifolds with orientation-reversing involutions.*

Nikolus Okamoto (2012, M.Sc.) *Generating the geometry algebra of a vector space with non-degenerate scalar product.*

Valerie Granger (2011, M.Sc.) *Representations of Clifford Algebras and Spinors.*

Nathanael Crutchfield (2008, M.Sc.) *Diffusion-reaction equations and modeling on fish population.*

Stephen Ornes (2003, M.Sc.) *Stability and equilibrium solutions of diffusion-reaction equations.*

### **Graduate Students Committees Served**

Dongyan Yan (Statistics Department, 2018). Doctoral Examining Committee.

Ryan Murphy (Math Department, 2010). Doctoral Examine Committee.

Ping Chen (Statistics Department, 2009). Doctoral Examining Committee.

Jeyi Ai (Computer Science Department, 2006). Masters Examining Committee.

Dan Cazacu (Math Department, 1998). Doctoral Examine Committee.

Chien-Liang Chiu (Economics department, 1997). Doctoral Examining Committee.

Chia-hung Ten (Economics department, 1996). Doctoral Examining Committee.

Julian Chen (Computer Science Department, 1995). Masters Examining Committee.

### **Courses taught at University of Missouri**

**Graduate Classes:** *Foliation Theory* (Riemannian foliations, taut foliations, Hodge Theorem)

*Global Analysis on Manifolds* (pseudo-differential operators, elliptic operators, Hodge Theory, Atiyah-Singer index theorems)

*Differentiable Manifolds and Riemannian Geometry* (Levi-Civita connections, Bianchi Identities)

*Algebraic Topology* (Mayer-Vietoris principle, Poincare duality, Thom class, double complex, spectral sequence)

*Differential Topology* (transversality, Degree of maps, Sard Theorem, and basic Morse Theory)

*Basic Topology & Geometry* (manifolds, tangent vectors, differential forms, flow, integration on manifolds, Stokes theorem)

*Introduction to Symplectic Geometry* (symplectic vector spaces, symplectic manifolds, Darboux's theorem, coadjoint orbits, Hamiltonian functions, moment maps, Poisson bracket, quantization)

*Seiberg-Witten Theory and Related Topics* (Dirac operators, Fredholm theory, characteristic classes, Sard-Smale theorem, Seiberg-Witten equations & invariants)

*Differential Geometry* (vector bundles, connections, curvatures, Riemann metrics)

*Introduction to Geometry & Topology* (point set topology, manifolds, tangent bundles, differential forms)

*Partial Differential Equations* (Elliptic boundary problems, parabolic/heat equations)

*Differential Geometry for Scientists and Engineers* (differentiable manifolds, vector bundles, connections, curvatures)

**Undergraduate Classes/Student Majors:**

*Ordinary Differential Equations* (Engineering, Biology, Economics, Agriculture, Math)

*Discrete Mathematics Structures* (Computer, Engineering, Statistics, Business)

*Calculus I, II and III* (All Science and Engineering majors)

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*Finite Mathematics* (Business, Psychology, Arts)

*Calculus for Social & Natural Sciences I, II* (Psychology, Agriculture, Biology)

## **SERVICE**

### **Professional Service**

Referee: *Journal of Geometry and Physics*; *Communications in Mathematical Physics*; *SIGMA*; *Communications in Applied Analysis*; *Journal für die Reine Angewandte Mathematik*; *Communications in Analysis and Geometry*; *Contemporary Mathematics*; *Transactions of the American Mathematical Society*; *Algebraic & Geometric Topology*; *Manuscript Mathematica*; *Proceedings of the American Mathematical Society*; *Acta Mathematica Sinica* (Series B); *Topology and Its Applications*; *Science in China*; *Scandinavia Mathematics*; *Novi Sad Journal of Mathematics*; *Bulletin of the South Korea Mathematical Society*.

Editor: *Austin Mathematics*, Austin Publishing Group, Secaucus, New Jersey.

Grant reviewer: Marsden Fund, Royal Society of New Zealand; National Science Foundation; University of Missouri Research Board.

Reviewer: *Mathematical Reviews* (1995-2003).

Reviewer: *Zentralblatt MATH*, Germany (2002-2011).

Evaluator: U.S. National Research Council, evaluated doctoral programs in 50 American universities (1995).

Evaluator: Oak Ridge Associated Universities - Junior Faculty Enhancement Award (1996).

Evaluator: Times Higher Education World University Rankings (2015, 2016).

Conferences Organized: Co-organizer (with S. Dostoglou and J. Segert) of the special session *Gauge theory and its interaction with holomorphic and symplectic geometry*, American Mathematical Society meeting at Columbia, Missouri, November 1-3, 1996.

Co-organizer (with John Beem and Jan Segert), *Midwest Geometry Conference*, Columbia, November 5-7, 1999.

### **Committee Service**

*Campus/College wide*:

Mizzou DEI Audit Forum Group (invited and set up by Chancellor's office, 2017)

A&S College Faculty Awards Committee (2016-2017)

A&S College Middlebush Chairs Selection Committee (2016)

Research Council Committee (2010-2013)

Student Financial Aid Committee (2008-2010, appointed by Chancellor)

Academics Grievance Committee (2000-2004)

Honorary Degrees Committee (2001-2004)

*Departmental level*:

Curriculum Committee (1995-2003, 2016-2017)

Miller Fund Committee (2003-2004, 2010-2012, 2016-2017)

Associate Professors Annual Review Committee (2016-2017)

Executive Committee (2011-2013)

English Screening for Graduate Students Committee (2006-2008)

Graduate Affairs Committee (several times during various periods)

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*(Cont. from Committee Service)*

Undergraduate Advising Committee (since 1992)  
Graduate Faculty Committee (since 1992)  
Doctoral Faculty Committee (since 1994)  
Library Committee (2006-2010)  
Hiring Planning Committee (2008)  
Annual Assistant Professor Review Committee, Chair (2008)  
Lower Level Algebra Coordinator Hiring Subcommittee (2008)  
Resource and Space Allocation Committee (2003-2008)  
Awards Committee (2003-2004)  
Graduate Recruitment Committee (2001-2003)  
Discrete Math Structures Course Coordinator (1999-2003)  
Major Field Assessment Committee (2001-2002)  
Subcommittee on Math BS, BA requirements for double majors (1997)  
Mathematical Physics Hiring Subcommittee (1995)