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Curriculum Vitae

Keiko Kawamuro

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1   Personal information

Address Department of Mathematics, University of Iowa, 14 MacLean Hall, Iowa City, Iowa 52242-1419.

Phone number 319-335-0792

2   Education and Appointment

- Associate Professor with tenure, University of Iowa, Fall 2015 –Present

- Assistant Professor, University of Iowa, Fall 2009 – Spring 2015

- Member of Institute for Advanced Study, 2009 Spring. (Postdoctoral mentor: Mark Goresky)

- G. C. Evans Instructor, Rice University, 2006–2009. (Postdoctoral sponsor: Tim Cochran)

- Ph. D., Mathematics, Columbia University, 2006. (Thesis advisor: Joan Birman)

3   Academic Honors, Awards and Memberships

- Simons Foundation, Mathematics and Physical Sciences-Collaboration Grants for Mathematicians (PI) "Applications of open book foliations" September 2016–August 2021.

- University of Iowa, Career Development Award, 2017 Spring.

- College of Liberal Arts and Sciences Dean's scholar at University of Iowa, 2015-2017.

- Member, Association of Women in Mathematics, 2015–Present.

- SQuaRE by American Institute of Mathematics "Contact and Symplectic Geometry and the Mapping Class Groups" (Co-PI with Inanc Baykur, John Etnyre and Jeremy Van-Horn Morris). 2014–Present.

- National Science Foundation Grant (Principal Investigator), "Braids and Contact Geometry" DMS-1206770.

- Flexible Load Assignment, 2012 Fall.

- Old Gold Summer Fellowship, 2010.

- National Science Foundation Grant (Principal Investigator), "Geometric Approach to Braid Theory" DMS-0806492, DMS-1016138.

- Research Fellowship for Young Scientists, Japan Society of promotion of Sciences, 1999–2001.

4 Publications and Preprints

1. *Central sequence subfactors and double commutant properties.*
   International Journal of Mathematics. 10 (1999), no. 1, 53–77.

2. *A Rohlin property for one-parameter automorphism groups of the hyperfinite II_1 factor.*
   Publications of the Research Institute for Mathematical Sciences 36 (2000), no. 5, 641–657.

3. *An extension of completely positive maps compatible with the Jones basic construction.*
   Multiformity of operator algebras (Kyoto, 2001). Surikaiseki kenkyusho Kokyuroku, No. 1230 (2001), 93–94.

4. *Algebraic crossing number and braid index of knots and links.*
   Algebraic & Geometric Topology 6 (2006), 2313–2350.

5. *Conjectures on the braid index and the algebraic crossing number.*
   Intelligence of Low Dimensional Topology (2006), 151–156. Series on Knots and Everything. World Sci. Publ., Hackensack, NJ, 2007.

6. *Khovanov-Rozansky homology and the braid index of a knot.*
   Proceedings of the American Mathematical Society volume 137, No. 7 (2009) 2459–2469.

7. *On transverse knots and branched covers.* (with Shelly Harvey and Olga Plamenvskaya)
   International Mathematics Research Notices (2009) : 512-546.

8. *Connect sum and transversely non simple knots.*
   Mathematical Proceedings of the Cambridge Philosophical Society, volume 146, (2009) issue 03, 661-669.

9. *On A. Weil.* (with Mark Goresky)
   Bulletin (New Series) of the American Mathematical Society. volume 46, No. 4, Oct 2009, 667-668.

10. *The Self-Linking Number in Annulus and Pants Open Book Decompositions.* (with Elena Pavelescu)
    Algebraic & Geometric Topology. 11 (2011), no. 1, 553-585.

11. *A polynomials invariant of pseudo-Anosov maps.* (with Joan Birman and Peter Brinkmann)
    Journal of Topology and Analysis. Vol. 4, No. 1 (2012) 13-47.

12. *The self-linking number in planar open book Decompositions.*
    Mathematical Research Letters. 19 (2012), no. 01, 41-58.

13. *Open book foliation.* (with Tetsuya Ito)
    Geometry & Topology 18 (2014) 1581-1634.

14. *Essential open book foliations and fractional Dehn twist coefficient.* (with Tetsuya Ito)
    Geometriae Dedicata, 187(1), 17-67. doi:10.1007/s10711-016-0188-7.

15. *Visualizing overtwisted discs in open books.* (with Tetsuya Ito),
    Publications of Research Institute for Mathematical Sciences. **50** (2014), 169-180.

16. *Operations on open book foliations.* (with Tetsuya Ito),
    Algebraic & Geometric Topology 14 (2014), no. 5, 2983-3020.

17. *Overtwisted discs in planar open books.* (with Tetsuya Ito),
    International Journal of Mathematics Vol. 26, No. 3 (2015) 1550027 (29 pages)

18. *On the self-linking number of transverse links.* (with Tetsuya Ito).
    Geometry & Topology Monographs 19 (2015) 157–171.

19. *Removing local extrema of surfaces in open book decompositions.*
    Intelligence of Low-dimensional Topology, RIMS kokyuroku **1960** (2015) 37–45.

20. *Coverings of open books.* (with Tetsuya Ito), Advances in the Mathematical Sciences, Association for Women in Mathematics Series Volume 6 (2016) 139–154.

21. *Quasi right-veering braids and non-loose links.* (with Tetsuya Ito), preprint.

22. *On a question of Etnyre and Van Horn-Morris.* (with Tetsuya Ito), Algebraic & Geometric Topology 17 (2017) 561–566.

23. *Positive factorizations of symmetric mapping classes.* (with Tetsuya Ito) preprint.

24. *Joan S. Birman and braid foliations.* Celebratio Mathematica (2017).

25. *The defect of Bennequin-Eliashberg inequality and Bennequin surfaces.* (with Tetsuya Ito) arXiv:1703.09322.

5 List of colloquia, research seminars, and talks at research conferences

5.1 Colloquia

1. Columbia Undergraduate Mathematical Society, Columbia University, October, 2005.

2. University of Iowa, January 21st, 2009.
   Transverse knots via braids.

3. University of Wisconsin, Madison, January 26th, 2009.
   Transverse knots via braids.

4. University of California, Santa Cruz, January 29th, 2009.
   Transverse knots via braids.

5. University of California, Riverside. March 11th, 2009.
   Transverse knots via braids.

6. Univ. Sci. Tech. China. July 7th, 2009.
   Braids, transverse knots, and the self linking number.

7. RTG special lecture at Michigan State University, April 13th, 2010.
   On geometric braids.

8. University of California, Riverside. March 14, 2012.
   Open book foliation.

9. Washington University. April 5, 2012.
   Open book foliation and overtwisted contact structure.

10. Utah State University. October 11, 2012.
    Open book foliation and its applications.

11. Western Illinois University. Feburary 13, 2013.
    Open book foliation and contact structures.

5.2 Research seminars

1. Operator algebra seminar, UCLA, December, 1998.

2. Operator algebra seminar, MSRI, November, 2000.

3. Operator algebra seminar, UCSB, January 2001.

4. Geometric topology seminar, Columbia University, December, 2005.

5. Geometry/topology seminar, SUNY at Buffalo, February, 2006.

6. Topology seminar at Rice University, August, 2006. *The algebraic crossing number and braid index of knots and links.*

7. Topology seminar at UT Austin, September, 2006. *The algebraic crossing number and braid index of knots and links.*

8. Topology seminar at Rice University, October, 2006. *Non-sharpness of the Morton-Franks-Williams inequality.*

9. Geometry/Topology seminar at University of Wisconsin-Madison, March 23rd, 2007.
   Relation between the writhes and the braid index of knots

10. Topology seminar at Rice University, August 27th, 2007.
    Khovanov-Rozansky homology and braid index.

11. Topology seminar at University of Iowa, October 11th, 2007.
    Khovanov-Rozansky homology and braid index.

12. Topology seminar at University of Iowa, October 12th, 2007.
    Contact surgery and branched covering.

13. Topology seminar at Rice University, January 14th, 2008.
    On transverse knots and branched covers.

14. Topology seminar at Columbia University, February 29th 2008.
    Transverse knots and their branched covers.

15. Institute for Advanced Study, May 22nd, 2008.
    Classification of transverse knots in contact manifolds.

16. Topology Seminar at Rice University, January 12th, 2009.
    Defining a self-linking number for transverse knots in the lens space $L(k, 1)$.

17. Topology seminar at Georgia Tech. March 2nd 2009.
    Annulus open book decompositions and the self linking number.

18. Topology and Geometry seminar at Penn State University Altoona. March 6th, 2009.
    Transverse knots via braids.

19. Geometric topology seminar at Columbia University, April 10th, 2009.

20. Topology seminar at Princeton University, April 23rd, 2009.

21. Geometric PDF seminar, IAS, Princeton. April 28th, 2009.

22. Topology seminar at University of Iowa. September 29th, 2009.
    Lorenz knots and pseudo-Anosov map.

23. Topology seminar at University of Iowa. February 23rd, 2010.

24. Columbia University Geometric Topology seminar. February 26th, 2010.

25. Notre Dome University, April 1st, 2010.

26. Topology seminar at Michigan State University, April 14th, 2010.
    Characteristic polynomials of pseudo-Anosov maps.

27. Topology seminar, Tokyo Institute of Technology, June 16th, 2010.
    A polynomial invariant of pseudo-Anosov maps.

28. Topology seminar, University of Tokyo, July 20th, 2010.
    A polynomial invariant of pseudo-Anosov maps.

29. Topology seminar, California Institute for technology, November 18th, 2010.
    An invariant of pseudo-Anosov maps

30. Topology seminar, CUNY Graduate center, December 8th, 2010.
    The self linking number and planar open books

31. Topology seminar, University of Iowa, February 17th, 2011.
    The self linking number and characteristic foliation I.

32. Topology seminar, University of Iowa, February 24th, 2011.
    The self linking number and characteristic foliation II.

33. Topology seminar, The University of Tokyo, July 11, 2011.
    The self linking number and planar open book decomposition.

34. Topology seminar, University of Iowa, September 22, 2011.
    Open book foliation and application to contact geometry.

35. Topology seminar, University of Georgia, Athens. February, 13, 2012.
    Open book foliation.

36. Topology seminar, Washington University. April 6, 2012.
    The self linking number of transverse knots.

37. Topology seminar, University of Tokyo. June 8, 2012.
    Introduction to Open Book Foliation.

38. Topology seminar at University of British Columbia. September 19, 2012.
    Open book foliation and fractional Dehn twist coefficient.

39. Topology seminar at Georgia Institute of Technology. October 1, 2012.
    Open book foliation and fractional Dehn twist coefficient.

40. Topology seminar at California Institute of Technology. October 26, 2012.
    Open book foliation and fractional Dehn twist coefficient.

41. Topology seminar at Duke University. November 6, 2012.
    Open book foliation and fractional Dehn twist coefficient.

42. Tuesday Topology seminar at University of Tokyo. March 19, 2013.
    Open book foliation and application to contact topology.

43. Topology seminar at Michigan State University. November 11, 2013.
    On overtwisted disks.

44. Topology seminar at University of Iowa, February 17, 2015.
    On virtually overtwisted contact structure.

45. Columbia University, April 29, 2016. *Quasi-right-veering braids and quasi-positive braids.*

5.3   Talks at research conferences

1. 4th Operator Algebras International Conference, Constanta, Romania, July 2001.

2. International KOOK seminar at Osaka City University, Osaka, Japan, July, 2004.

3. Knots in Washington, George Washington University, December, 2005.

4. Intelligence of Low Dimensional Topology 2006, Hiroshima, July, 2006.

5. Second Louisiana-Texas-Topology-Retreat at LSU, Baton Rouge, February 4th, 2007.
   3-braids and the algebraic crossing number.

6. The Many Strands of the Braid Groups at Banff International Research Station, Canada, April 26th, 2007. *Braid index and algebraic crossing number.*

7. AMS meeting at LSU, March 29th, 2008.
   Negative flype & transverse knot.

8. AMS Mathematics Research Communities, Snowbird, June 16th, 2008.
   Generalized Jones' conjecture.

9. Knots in Washington XXVII, George Washington University, January 11th, 2009.
   Braids and Open Book Decompositions.

10. Conference on Topology and Geometry of Knots at Oklahoma State University. March 20-21, 2009.

11. MSRI, Knot Homology Theories Connections for Women workshop. January 21st, 2010.
    Characteristic polynomials of pseudo-Anosov maps.

12. Workshop on pseudo-Anosovs with small dilatation at University of Wisconsin, Madison, April 24th, 2010.
    Characteristic polynomials of pseudo-Anosov maps.

13. AMS meeting at New Jersey Institute of Technology. May 23, 2010.
    Polynomial Invariants of Pseudo-Anosov maps.

14. Knots, Contact Geometry and Floer Homology, Tambara, Japan. May 30th, 2010.
    A polynomial invariant of pseudo-Anosov maps.

15. Conference "Geometry, Dynamics, and Topology Day 2011". Eastern Illinois University, March 26th 2011.

16. International Conference "Braids in Seville" at Universidad de Sevilla, Spain, June 15th, 2011.
    Braids in planar open books & the self linking number.

17. AMS sectional meeting, Lincoln Nebraska. October 15, 2011.
    Open book foliation.

18. AMS sectional meeting, Tampa, FL. March 11, 2012.
    Essential open book foliation.

19. "Georgia Topology Conference 2012", University of Georgia, Athens, GA, May 12, 2012.
    Open book foliation & tightness criteria of contact structures.

20. "Workshop and Conference on Holomorphic Curves and Low Dimensional Topology" Stanford University, CA, August 2, 2012. *Open Book Foliation and Applications.*

21. "Homological Invariants in Low-dimensional Topology" AMS Spring Eastern Sectional Meeting, Chestnut Hill, Massachusetts. April 6, 2013.
    Bypass move and stabilization of open books.

22. "Interactions between low dimensional topology and mapping class groups" Max Plank Institute, Bonn, Germany, July 4th, 2013.
    The self linking number of transverse links and the Johnson-Morita homomorphism.

23. "Geometric Topology of Knots and 3-manifolds" AMS sectional meeting at Temple University, October 13, 2013. *The self-linking number of transverse links and sharpness of Bennequin-Eliashberg inequality.*

24. "Geometric Topology in Low Dimensions" AMS sectional meeting at Washington University, October 20, 2013. *The self-linking number of transverse links and sharpness of Bennequin-Eliashberg inequality.*

25. "AWM Research Symposium 2015" University of Maryland, April 11-12, 2015.
    Applications of open book foliations.

26. "Knots, braids, and mapping classes" A conference in honor of Bill Menasco's 60th birthday, University at Buffalo, May 11-12, 2015. *Some applications of open book foliations.*

27. "Intelligence of Low-dimensional Topology (ILDT)" at Research Institute for Mathematical Sciences, Kyoto, Japan. May 20-22, 2015. *Removing local extrema of surfaces in open book decompositions*

28. "Advances in Quantum and Low-Dimensional Topology" at the University of Iowa, March 11-13, 2016.
    Quasi-right-veering braids.

29. "Georgia Topology Conference" at University of Georgia, May 28 2016. *Quasi positive braids and cyclic branched coverings.*

30. AMS Special Session on "Symplectic Geometry and Contact Geometry" at University of St. Thomas (Minneapolis), Oct. 29, 2016. *Positive factorizations of symmetric mapping classes.*

6 Public Lectures and talks

1. Lecture to local elementary school kids (K-6), "Play with a möbius band" at Zion Lutheran Church, Iowa City, December 10, 2016.

2. College of Liberal Arts & Sciences Dean's Advisory Board Meeting. September 17, 2015.
   My research and teaching.

3. Public lecture series: "Math is attractive (Sugaku no miryoku) for middle school and high school girls", University of Tokyo. March 17, 2013.
   Talk 1. *Female mathematicians I met in the world.*
   Talk 2. *Feel spaces by open books.*

7 Teaching Experience

- Honors Math Calculus III, Fall 2003 (recitation session) at Columbia University.

- Honors Math Calculus IV, Spring 2004 (recitation session) at Columbia University.

- Calculus I, Fall 2004 at Columbia University.

- Calculus II, Spring 2005 at Columbia University.

- Multi-valuable calculus, (Math 212) Fall 2006, Spring 2007, Fall 2007, Spring 2008 at Rice University.

- Complex analysis, (Math 382) Spring 2007, Spring 2008 at Rice University.

- Single Variable Calculus I, (Math 101) Fall 2008 at Rice University

- Topics in Topology, (Math 541) Fall 2008 at Rice University

- Engineering Mathematics V: Vector Calculus. (22M:037:131) Fall 2009, Spring 2011, Spring 2013, Fall 2016 at University of Iowa

- Introduction to Abstract Algebra I (22M:050:A01) Spring 2010 at University of Iowa

- Matrix Theory (22M:127:001) Spring 2010, 2011 at University of Iowa

- Topology of Manifolds (22M:203:001) Fall 2010, Fall 2015 at University of Iowa.

- Algebraic Topology (22M:201:001) Fall 2011, Fall 2014, Fall 2016 at University of Iowa.

- Calculus for the Biological Sciences (22M:016) Spring 2012 at University of Iowa.

- Introduction to Smooth Manifolds (22M:133) Spring 2013 at University of Iowa.

- Calculus and Matrix Algebra for Business (22M:17) Fall 2013 at University of Iowa.

- Math for biological sciences (22M015) Fall 2014, Fall 2015 at University of Iowa.

- Practicum in College Teaching (GRAD:7400:0009) Fall 2015, Fall 2016.

8   Postdocs and Ph.D. students

8.1   Postdoc

- Amey Kaloti (Ph.D. 2014, Georgia Institute of Technology, "Stein fillings of contact structures supported by planar open books")

8.2   Ph.D. Students

- Marcos Ortiz (Ph.D. 2015, "Convex decomposition techniques applied to handlebodies")

- Camila Ramirez (Ph.D. 2017 expected. Open book foliations and coverings.)

- Jesse Hamer (Ph.D. 2018 expected.)

- Tyler Schroeder (Ph.D. 2018 expected.)

8.3   Mentoring

- Rich Ligo (Presidential Ph.D. student Ph.D. 2017 expected.)

9   Service

9.1   Committee

- Undergraduate committee Fall 2015–present

- Search committee Fall 2015.

- Executive committee Fall 2013–Spring 2014 and Fall 2015–present.

- Ph.D. Qualifying Exam Committee Fall 2013. Spring 2014, Fall 2014, Spring 2015.

- Committee of the 2nd Year Review for Ben Cooper, Spring 2016.

- Comprehensive Exam Committee:
  Mike Fitzpatrick (December 2011), Nathan Druivenga (August 2012), Marcos Ortiz (December 2012), Colin Grove (September 2013), Nelson Colon (September 2013), Dido Salazar-Torres (December 2013), Camila Ramirez (October, 2014), Daniel Rodman (April 2015), Richard Ligo (May 8th, 2015), Jesse Hamer (April 2016), Tyler Schroeder (November 2016).

- Defense committee:
  Soojeong Kim, April 2010. Paul H. Drube, April 2011. Alexander M. Zupan, April 26. 2012. Dido Salazar-Torres April 1, 2015. Colin Grove, January 28, 2016. Rich Ligo, April 14, 2017.
  Camila Ramirez, April 20, 2017.

9.2   Other services

- Volunteer at WiSE Ambassadors 3rd Annual Mocktail November 5th, 2016.

- Advising to girls (K-6) in Lincoln Elementary school in Iowa City for the annual STEM day event. 2015-2016.

- Co-organizer: ICERM/Brown University summer workshop "Combinatorial link homology theories, braids, and contact geometry". August 2014.

- Referee:

  - Transactions of the American Mathematical Society. (2016)
  - (Book) The Graduate Studies in Mathematics series of AMS. (2015)
  - Geometry and Topology Monographs. (2014, 2015)
  - Journal of Knot Theory and Its Ramifications. (2008, 2014, 2016)
  - Communications in Math Physics (2009).
  - Forum Mathematicum (2011).
  - Algebraic and geometric topology. (2013-2014, 2015, 2016-2017)
  - Proceedings of AMS (2014).

- Reviewer of Zentralblatt MATH

  - Rational Linking and Contact Geometry (2014)
  - On the $S^1 \times S^2$ HOMFLY-PT invariant and Legendrian links (2013)

- Panel for the prospective math graduate students, March 2015, April 2016.

- Organizer of contact geometry seminar, Spring 2012, Fall 2013. Fall 2014–Present.

- Organizer of Heegaard Floer homology seminar, Fall 2015–Present.

- Organizer of convex surface seminar, Fall 2014–Spring 2015.

- Organizer of Knots and links seminar, Spring 2015.

- Organizer of topology seminar at University of Iowa, Spring 2010–Spring 2013.

- Co-organizer of topology reading seminar at University of Iowa, Fall 2012–Spring 2013.

- Co-organizer of University of Iowa mathematics department colloquium, Fall 2009–Spring 2011.

- Co-organizer of Rice University mathematics department colloquium, 2006–2008.

- Co-organizer of graduate student teaching seminar, 2007-2008.

- Organizer of Columbia University geometric topology seminar, 2005-2006.