

**Personal**

Born in Saku-shi, Nagano, Japan in July, 1973. Japanese citizen.

**Current position**

Position: Professor

Employer: Center for Education in Liberal Arts and Sciences, Osaka University

Address: 1-16 Machimakeyama-cho Toyonaka, Osaka, Japan

Office Phone: +81-6-6850-6967

E-mail: kin.eiko.celas@osaka-u.ac.jp

Home page: <http://www.math.sci.osaka-u.ac.jp/~kin/>

Research map: [https://researchmap.jp/eiko\\_kin/](https://researchmap.jp/eiko_kin/)

**Education**

- Doctor of Science, 2001, Nara Women's University. Advisor: Tsuyoshi Kobayashi
- Master of Science, 1998, Nara Women's University. Advisor: Masaru Ueda
- Bachelor of Science, 1996, Nara Women's University

**Academic positions**

- Osaka University, Professor (2021–).
- Osaka University, Associate professor (2012–2021).
- Tokyo Institute of Technology, Lecturer (2006–2012).
- Kyoto University, 21st century Kyoto University Reserch Fellowships (2004–2006).
- Kyoto University, JSPS Reserch Fellowships for Young Scientists (2001–2004), Postdoc Sponsor: Hiroshi Kokubu.
- Georgia Institute of Technology, Research visitor (2001–2002), Sponsor: Robert Ghrist.

**Membership of Academic Societies**

Mathematical Society of Japan.

**Research grants**

- Grant-in-Aid for Scientific Research(C), JSPS KAKENHI, Grant No. 21K03247, 2021–2025.
- Grant-in-Aid for Scientific Research(C), JSPS KAKENHI, Grant No. 18K03299, 2018–2021.
- Grant-in-Aid for Scientific Research (C), JSPS KAKENHI, Grant No. 15K04875, 2015–2017.
- Early-Career Scientists (B), JSPS KAKENHI, Grant No. 24740039, 2012–2014.
- Early-Career Scientists (B), JSPS KAKENHI, Grant No. 20740031, 2009–2011.
- Early-Career Scientists (B), JSPS KAKENHI, Grant No. 17740094, 2006–2008.
- Nara Women's University Excellent students Scholarship, 1995.

**Area**

Dynamical systems, Low dimensional topology

## Research Keywords

Braid groups, mapping class groups, Pseudo-Anosovs, dilatations (topological entropies), asymptotic translation lengths

## Conference organizers

- Organizing Committee, The 7th MSJ-SI, Hyperbolic Geometry and Geometric Group Theory (2014), University of Tokyo.
- Organizer, Dynamical systems and related topics (2012), RIMS.
- Organizer, Frontiers in Dynamical systems and Topology (2011), RIMS.
- Organizer, Topology and Computers (2010), Tokyo Tech.
- Organizer, Topology and Computers (2009), Tokyo Tech.

## Seminar organizers

- Topology seminar at Tokyo Tech (2007–2012).
- Topology working seminar at Osaka University (2016–2017).
- Low dimensional topology seminar at Osaka University (2018–present).

## Outreach

- Lecture for high school students, 36th JST caravan, Chubu University, December 2022.
- Speech at Female scientists Summit, Osaka University, November 2018.
- Lecture for high school students, 26th JST caravan, Osaka, May 2018.
- Lecture for high school students, Osaka University, August 2017.
- Lecture at Science cafe, Osaka University, October 2013.
- Lecture at Science cafe, Hiroshima University, August 2008.

## Teaching at Tokyo Tech (Fall 2006–Spring 2012)

- Linear Algebra I, Spring 2007, Spring 2011.
- Advanced Linear Algebra, Spring, 2012.
- Group theory, Fall 2006, Fall 2008, Fall 2011.
- Set and Topology I and II, Spring 2010, Fall 2008, Fall, 2009.
- Combinatorics, Fall 2007, Fall 2009, Fall 2010.
- Advanced (discrete) topology/geometry, Fall 2006, Fall 2007, Spring 2008, Spring 2009, Fall 2010, Fall 2011, Spring 2012. [This is the course for information science students. I taught Braid groups and related topics, Conjugacy problem on Braid groups and Cryptography, Mapping class groups, Ordered groups and topology.]

## Teaching at Osaka University (Fall 2012–present)

- Information Literacy for the 1st year students, Spring 2014, Spring 2015.
- A Door to Academia (Mathematics of Symmetry and Periodicity), Spring 2020.
- Linear Algebra B for engineering course, Fall 2012, Fall 2014, Fall 2015, Fall 2018.
- Linear Algebra I and II for science course, 2015, 2018.
- Linear Algebra I and II for engineering course, 2022.
- Linear Algebra I for mathematics course, Spring 2019.
- Linear Algebra II for mathematics course, Spring 2020.
- Calculus A and B for engineering course, Spring 2013, Fall 2016, Fall 2017, Spring

2019.

- Mathematics B for medical course, Fall 2013.
- Mathematics A for liberal arts, Spring 2018.
- Calculus I for chemical course, Spring 2022.
- Calculus with Exercises II for physics course, Fall 2021.
- Vector calculus, Spring 2014, Spring 2017.
- Algebraic geometry, Fall 2014.
- Set and Topology I, Spring 2016.
- Topology of Manifolds, Spring 2017, Spring 2021.
- Advanced geometry; Geometric group theory, Spring 2013.
- Advanced geometry; Ordered groups and Topology, Spring 2016, Spring 2019.

### **Special Lectures**

I gave special lectures for graduate students and Postdoc at University of British Columbia (2015), Nara Women's University (2010, 2016), RIKEN (2017), KAIST (2018) and Kyoto University (2022).

### **Departmental Colloquia talks**

- Nara Women's University, December 2016.
- Tokyo Tech, December 2013.
- Osaka University, October 2012, December 2022.
- Jyosai University, February 2012.
- Nara Women's University, June 2010.
- Osaka city University, November 2005.

### **Conference talks**

- The 19th East Asian Conference on Geometric Topology, RIMS, Kyoto University, Kyoto, February 2024.
- ICIAM 2023 Tokyo, Waseda University, Tokyo, August 2023.
- Characters and Moduli of Surfaces, RIMS, Kyoto, July 2023.
- Low dimensional topology and number theory XIII, Kyusyu University, Fukuoka, March 2022.
- Workshops on geometry of foliations and its applications, Zoom, December 2021.
- Mathematics of quasi-periodic order and related topics, RIMS Symposium, November 2021.
- Topics at the Interface of Low Dimensional Group Actions and Geometric Structures, Institute for Mathematical Sciences National University of Singapore, January 2021.
- The 15th East Asian Conference on Geometric Topology, RIMS, Kyoto University, Japan, February 2020.
- Topological and probabilistic methods in low-dimensional dynamics, Shanghai Center for Mathematical Sciences, China, October 2019.
- EKOOK 2019, Kobe University, August 2019.
- 14th East Asian Conference on Geometric Topology, Peking University, China, January 2019.
- Classical and quantum three manifold topology, Monash University, Australia,

December 2018.

- EKOOK 2018, Osaka city University, September 2018.
- Geometric and Asymptotic Group Theory with Applications 2018, KIAS, July 2018.
- Geometry and Topology of 3-manifolds workshop, OIST, May 2018.
- Differential Topology Workshop 18, Tsukuba, March 2018.
- Growth 4, Waseda, April 2017.
- Low dimensional topology and number theory IX, Kyushu University, March 2017.
- The 12th East Asian School of Knots and Related Topics, University of Tokyo, February 2017.
- Riemann surfaces and related topics, University of Tokyo, September 2016.
- Riemann surfaces and discontinuous groups, Tokyo Tech, February 2016.
- The 11th East Asian School of Knots and Related Topics, Osaka City University, January 2016.
- Winter dynamical systems workshop, Nihon University, January 2015.
- Hurwitz action, Osaka Electro-Communication University, January 2015.
- Boston University/Keio University Workshop 2014, September 2014.
- Geometric Group Theory and Geometric Structures, KAIST, August 2014.
- Topology and Computers, Meiji University, November 2013.
- Riemann surfaces and discontinuous groups, Osaka University, January 2013.
- Growth, Osaka City University, February 2012.
- Frontiers in Dynamical systems and Topology, RIMS, November 2011.
- Workshop on Applied Topology & Dynamical Systems, Kyushu University, September 2011.
- The 7th East Asian School and Knots and Related topics, Hiroshima University, January 2011.
- Intelligence of Low-dimensional Topology, RIMS, June 2010.
- Workshop on Geometry, Topology and Dynamics of Character Varieties, Institute for Mathematical Sciences, NUS, July 2010.
- Spring Topology and Dynamical systems Conference 2010, Mississippi State University, March 2010.
- Simplicial Complexes Arising in Low-Dimensional Topology, Tokyo Tech, July 2009.
- The 5th East Asian School of Knots and Related Topics, Gyeongju, January 2009.
- Hyperbolic geometry and related topics, KIAS, December 2008.
- Topology symposium, Kanazawa University, August 2008.
- The 4th East Asian School of Knots and Related Topics, University of Tokyo, January 2008.
- The many strands of the braid groups, Banff International Research Station, April 2007.
- Foliation and dynamical systems, University of Tokyo, February 2007.
- MSJ Autumn meeting, Osaka City University, September 2006.
- Knots and geometry and algebra of Manifolds III, Konan University, August 2005.
- Dynamical systems–Topology and computations, RIMS, June 2005.
- Japan-Taiwan Conference on Dynamical systems, National Tsing-Hua University,

March 2005.

- Applied mathematics workshop, Ryukoku University, December 2004.
- Nonlinear dynamics and experiments, RIMS, October 2004.
- MSJ Autumn meeting, Hokkaido University, September 2004.
- The 1st KOOK Seminar International for Knot Theory and Related Topics, Awaji, July 2004.

### **Seminar talks**

- Topology seminar, University of Iowa, November 2023.
- The 5th Interdisciplinary Seminar on Topology and Its Applications, Zoom, January 2022.
- Kanazawa topology seminar, Kanazawa University, July 2021.
- Topology Tuesday seminar, University of Tokyo, December 2020.
- Applied mathematics seminar, Kyoto University, June 2019.
- Dynamical systems seminar, Kyoto University, June 2019.
- Topology seminar, Michigan State University, May 2019.
- Topology seminar, Nara Women's University, December 2018.
- Topology seminar, KAIST, August 2018.
- Low dimensional topology seminar, Osaka University, July 2018.
- Low dimensional topology seminar, Osaka University, May 2018.
- Topology and geometry seminar, Hiroshima University, November 2017.
- Topology Tuesday seminar, University of Tokyo, June 2017.
- Topology seminar, KAIST, August 2016.
- Topology seminar, University of British Columbia, November 2015.
- Topology and geometry seminar, Hiroshima University, November 2015.
- Topology seminar, University of British Columbia, March 2015.
- KOOK seminar, Osaka City University, December 2014.
- Tokyo University of Science, November 2013.
- Topology seminar, Tukuba University, October 2013.
- Dynamical systems seminar, Kyoto University, October 2012.
- RIMS seminar, Hakone, May 2012.
- Knotting Nagoya, Nagoya Institute of Technology, June 2011.
- Low dimensional topology seminar, Osaka University, November 2008.
- Topology seminar, Hokkaido University, July 2008.
- Geometry seminar, Tohoku University, November 2007.
- Topology seminar, Nara Women's University, November 2007.
- Topology Tuesday seminar, University of Tokyo, July 2007.
- Topology seminar, Kyusyu University, November 2006.
- Topology seminar, Tokyo Tech, October 2006.
- Topology seminar, Tokyo Women's University, October 2005.
- Topology seminar, KAIST, October 2005.
- Low dimensional topology seminar, Osaka University, June 2005.
- Differential topology seminar, Kyoto University, May 2005.

### **Service**

- JSPS KAKENHI reviewer, 2019–2021.

- JSPS KAKENHI reviewer, 2016–2017.
- Gender Equality Promotion Committee (MSJ), July 2013–June 2017.

**Miscellaneous**

- Japanese high school teacher's license (mathematics).
- Calligraphy 2 dan (2nd degree).

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## References

- [KKS23] Yuika Kajihara, Eiko Kin and Mitsuru Shibayama, *Braids, metallic ratios and periodic solutions of the  $2n$ -body problem*, *Topology and its Applications* 337 (2023).
- [HK24] Susumu Hirose and Eiko Kin, *Braids, entropies and fibered 2-fold branched covers of 3-manifolds*, to appear in the book ‘Low Dimensional Topology and Number Theory’, Springer Proc. Math. Stat. (Springer, Cham) 2024.
- [HKK23] Susumu Hirose, Efstratia Kalfagianni and Eiko Kin, *Volumes of fibered 2-fold branched covers of 3-manifolds*, *Journal of Topology and Analysis* (2023).
- [HNC22] Eiko Kin, Hiroaki Nakamura and Hiroyuki Ogawa, *Lissajous 3-braids*. *J. Math. Soc. Japan* 75 (2023), no. 1, 195–228.
- [BKS22] H. Baik, E. Kin, H. Shin and C. Wu, *Asymptotic translation lengths and normal generations of pseudo-Anosov monodromies for fibered 3-manifolds*. *Algebr. Geom. Topol.* 23 (2023), no.3, 1363–1398.
- [HIKK21] S. Hirose, D. Iguchi, E. Kin and Y. Koda, *Goeritz groups of bridge decompositions*, *International Mathematics Research Notices* (2021). <https://doi.org/10.1093/imrn/rnab001>
- [KH21] E. Kin and S. Hirose, *A construction of pseudo-Anosov braids with small normalized entropies*, *New York J. Math.* 26 (2020), 562–597.
- [KH20] E. Kin and S. Hirose, *On hyperbolic surface bundles over the circle as branched double covers of the 3-sphere*, *Proc. Amer. Math. Soc.* 148 (2020), 1805–1814.
- [KS18] E. Kin and H. Shin, *Small asymptotic translation lengths of pseudo-Anosov maps on the curve complex*. *Groups, Geometry, and Dynamics* 13, (2019), no. 3, 883–907. DOI 10.4171/GGD/508
- [KR18] E. Kin and D. Rolfsen, *Braids, orderings and minimal volume cusped hyperbolic 3-manifolds*. *Groups, Geometry, and Dynamics* 12, No. 3 (2018) 961–1004. DOI: 10.4171/GGD/460
- [HK17] S. Hirose and E. Kin, *The asymptotic behavior of the minimal pseudo-Anosov dilatations in the hyperelliptic handlebody groups*. *Quarterly Journal of Mathematics* 68 (2017) 1035-1069.
- [KT16] E. Kin and M. Takasawa, *The boundary of a fibered face of the magic 3-manifold and the asymptotic behavior of the minimal pseudo-Anosov dilatations*. *Hiroshima Math. Journal* 46, No. 3, (2016) 271-287.

- [Kin15] E. Kin, *Dynamics of the monodromies of the fibrations on the magic 3-manifold*. New York Journal of Mathematics 21 (2015) 547-599.
- [KKT13] E. Kin, S. Kojima and M. Takasawa, *Minimal dilatations of pseudo-Anosovs generated by the magic 3-manifold and their asymptotic behavior*. Algebraic and Geometric Topology 13 (2013) 3537-3602.
- [KT13] E. Kin and M. Takasawa, *Pseudo-Anosovs on closed surfaces having small entropy and the Whitehead sister link exterior*. Journal of the Mathematical Society of Japan 65, Number 2 (2013) 411-446.
- [KT11] E. Kin and M. Takasawa, *Pseudo-Anosov braids with small entropy and the magic 3-manifold*. Communications in Analysis and Geometry 19, volume 4 (2011) 705-758.
- [KKT09] E. Kin, S. Kojima and M. Takasawa, *Entropy versus volume for pseudo-Anosovs*, Experimental Mathematics 18 (2009) 397-407.
- [KT08] E. Kin and M. Takasawa, *An asymptotic behavior of the dilatation for a family of pseudo-Anosov braids*. Kodai Mathematical Journal 31 (2008) 92-112.
- [Kin08] E. Kin, *The forcing partial order on a family of braids forced by pseudo-Anosov 3-braids*. Osaka Journal of Mathematics 45 (2008) 757-772.
- [HK06] E. Hironaka and E. Kin, *A family of pseudo-Anosov braids with small dilatation*. Algebraic and geometric topology 6 (2006) 699-738.
- [KS05] E. Kin and T. Sakajo, *Efficient topological chaos embedded in the blinking vortex system*. Chaos 15 (2005).
- [GK04] R. Ghrist and E. Kin, *Flowlines transverse to knot and link fibrations*. Pacific journal of math 217 (2004) 61-86.
- [HK04] M. Hirasawa and E. Kin, *Determination of generalized horseshoe maps inducing all link types*. Topology and Its Applications 139 (2004) 261-277.
- [Kin01] E. Kin, *A suspension of an orientation preserving diffeomorphism of  $D^2$  with a hyperbolic fixed point and universal template*. J. Knot Theory Ramifications 9 (6) (2000) 771-795.
- [Kin00] E. Kin, *The third power of the Smale horseshoe induces all link types*. J. Knot Theory Ramifications 9 (7) (2000) 939-953.

## Preprints

Keiko Kawamuro and Eiko Kin, *Complete description of Agol cycles of pseudo-Anosov 3-braids*. (2023) arXiv:2312.04486