Bingyuan Liu

Contact Information

Department of Mathematics
The University of Texas
Rio Grande Valley
TX 78539, USA

bingyuan.liu@utrgv.edu
sites.google.com/site/bingyuanliu/

Research Interests

PDEs, Several Complex Variables, Complex/Algebraic Geometry, Sub-Riemannian Geometry, Dynamical Systems and Applied Mathematics

Appointments

2020-present	Assistant Professor, **the University of Texas Rio Grande Valley**
2018-2020	Visiting Assistant Professor, **University of Arkansas Fayetteville**
2015-2018	Visiting Assistant Professor, **University of California Riverside**

Education

Washington University

Ph.D. in Mathematics, August 2015

- Dissertation Topic: Several complex variables, complex geometry and their applications.
- Advisor: Steven Krantz

M.A. in Mathematics, May 2011

Royal Institute of Technology (KTH)

M.S. in Mathematics, May 2009

- Dissertation Topic: Classical inequalities for the discrete spectrum of Schrödinger operators.
- Advisor: Ari Laptev

Beijing University of Technology (Special Class for the Gifted Students)

B.E. in Computer Science, May 2006

Awards and Honors

2022	UTRGV Faculty Seed Research Grants (as PI)
2022	AMS-NSF Travel Grant
2022	Faculty Travel Grant for the JMM
2022–2023	UTRGV Travel Funding for the JMM
2019	MSRI Travel fund: Recent developments in microlocal analysis Workshop
2018–2019	UARK Dean's travel grant
2015–2018	UCR travel Grant
2015	AMS Grad Student Travel Grant, Sectional Meeting (MSU)
2015	AMS Grad Student Travel Grant, Joint Mathematics Meetings

Visiting Positions

Aug.-Sept. 2016	National Autonomous University of Mexico (Cuernavaca)
May-June 2015	National Autonomous University of Mexico (Cuernavaca)
June 2015	Autonomous University of Yucatan, Mexico

Publications

Diederich-Fornæss index and global regularity in the $\overline{\partial}$-Neumann problem: domains with comparable Levi eigenvalues. Joint with Emil Straube. Submitted (2022). Available at https://arxiv.org/abs/2207.14197.

The $\bar{\partial}$-Neumann problem and boundary integral equations. Accepted (2022). Int. J. Math.. Available at https://arxiv.org/abs/2104.09659.

Ground state solution of the thin film epitaxy equation. Joint with Yu Su and Zhaosheng Feng. J. Math. Anal. Appl. **503** (2021), no. 2, Paper No. 125357, 28 pp.

The complex Green operator with Sobolev estimates up to a finite order. Joint with Andrew Raich. Int. J. Math. **31** (2020), no. 14, 2050122.

The Diederich–Fornæss index and the regularities on the $\bar{\partial}$-Neumann problem. Indiana U. Math. J. **71** (2022), no. 4, 1371-1395.
Available at `https://arxiv.org/abs/1906.00315`.

The $\bar{\partial}$-Neumann operator with the Sobolev norm of integer orders. Joint with Phillip Harrington. Comm. Partial Differential Equations **45** (2020), no. 10, 1435-1450.
Available at `https://arxiv.org/abs/1905.04238`.

The PDE method on the Riemann mapping theorem. Handbook of complex variables (2021).

The Diederich–Fornæss index II: for domains of trivial index. Adv. Math. **344** (2019), 289-310. Available at `https://arxiv.org/abs/1701.07418`.

The Diederich–Fornæss index I: for domains of non-trivial index. Adv. Math. **353** (2019), 776-801. Available at `https://arxiv.org/abs/1701.00293`.

Geometric Analysis on the Diederich-Fornæss Index. Joint with Steven Krantz and Marco Peloso. J. Korean Math. Soc. **55** (2018), no. 4, 897 - 921. Available at `http://arxiv.org/abs/1606.02343`.

Two applications of the Schwarz lemma. Pacific J. Math. **296** (2018), no. 1, 141 - 153. Available at `http://arxiv.org/abs/1412.2680`.

On the domains with noncompact automorphism groups. J. Math. Anal. Appl. **465** (2017), no. 2, 903 - 911.

The intrinsic geometry on bounded pseudoconvex domains. J. Geom. Anal. **28** (2018), no. 2, 1728 - 1748. Available at `https://arxiv.org/abs/1610.06530`.

The limit set for discrete complex hyperbolic groups. Joint with Angel Cano and Marlon López. Indiana U. Math. J. **66** (2017), no. 3, 927 - 948. Available at `http://arxiv.org/abs/1506.08113`.

Analysis of orbit accumulation points and the Greene–Krantz conjecture. J. Geom. Anal. **27** (2017), no. 1, 726 - 745. Available at `http://arxiv.org/abs/1407.5546`.

Finite type domains with hyperbolic orbit accumulation points. J. Math. Anal. Appl. **415** (2014), no. 1, 314 - 324. Available at `http://arxiv.org/abs/1305.0046`.

The Wong–Rosay type theorem for Kähler manifolds. Preprint (2014). Available at `http://arxiv.org/abs/1407.5036`.

Several complex variables, complex geometry and their applications. PhD thesis (2015).

Classical inequalities for the discrete spectrum of Schrödinger operators. Preprint (2009).

Teaching and Mentoring Experience

Mentoring: Asha Barua "Cardinality Of Irrational Numbers In The Cantor Set"
Teaching:

School	Period	Courses Taught
UTRGV	2020-	Analysis, Graduate Analysis, Calculus, Math. for Engineering
UARK	2018-2020	Calculus, Diff. Eq., Math. for Business and Social Sciences
UCR	2015-2018	Calculus, Complex Variables

Invited Talks

Zu Chongzhi Center Mathematics Research Seminar, Duke Kunshan, China (November 2022)

(Hyper) Complex Analysis and Geometry, Milan, Italy. (September 2022)

2022 Virtual Workshop in Analysis and Geometry, Jilin, China. (July 2022)

AMS Joint Mathematics Meetings, Seattle. (January 2022)

Seminar, University of Toledo, Online. (October 2021)

Seminar, East-West SCV, USA–Austria–Qatar, Online. (May 2021)

AMS Joint Mathematics Meetings, Online. (January 2021)

AMS Fall Western Sectional Meeting, University of California, Riverside, USA. (November 2019)

The 4th Annual Northeastern Analysis Meeting, University of Syracuse, USA. (October 2019)

Tianyuan International conference in Several Complex Variables, Changchun, China. (July 2019)

AMS Spring Central and Western Joint Sectional Meeting, University of Hawaii, Manoa, USA. (March 2019)

Several Complex Variables and Partial Differential Equations, Texas A&M University, Doha, Qatar. (January 2019)

AMS Fall Southeastern Sectional Meeting, University of Arkansas, Fayetteville, USA. (November 2018)

Colloquium, Georgia Southern University, Statesboro, USA. (October 2018)

Seminar, University of California, San Diego, USA. (February 2018)

AMS Fall Western Sectional Meeting, University of California, Riverside, USA. (November 2017)

AMS Fall Eastern Sectional Meeting, State University of New York, Buffalo, USA. (September 2017)

Seminar, Texas A&M University, College Station, USA. (April 2017)

AMS Spring Western Sectional Meeting, Washington State University, Pullman, USA. (April 2017)

Seminar, Rutgers University, Camden, USA. (February 2017)

Fullerton Geometry and Topology Seminar, California State University, Fullerton, USA. (November 2016)

Midwestern Workshop on Asymptotic Analysis, Indiana University Purdue University Fort Wayne, USA (October 2016)

Mini-course on Several Complex Variables, Autonomous University of Yucatan, Mexico. (June 2015)

AMS Central Spring Sectional Meeting, Michigan State University, USA. (March 2015)

JHU-UMD Complex Geometry Seminar, University of Maryland, USA. (February 2015)

AMS Fall Western Sectional Meeting, San Francisco State University, USA. (October 2014)

39th Spring Lecture Series, University of Arkansas, USA. (Aprial 2014)

AMS Spring Eastern Sectional Meeting, University of Maryland, USA. (March 2014)

29th Southeastern Analysis Meeting, Virginia Tech, USA. (March 2013)

Other Talks

Minor Oral, Washington University, USA. (April 2011)

Math. Circle, Washington University, USA. (February 2012)

Major Oral, Washington University, USA. (May 2012)

Graduate Organized Seminar, Washington University, USA. (August 2012)

Szegö Seminar, Washington University, USA. (January 2014)

Analysis Seminar, Washington University, USA. (April 2012, October 2012, November 2013, March 2014 and October 2014)

Seminars, National Autonomous University of Mexico (UNAM), Mexico. (May-June, 2015)

Seminars, University of California, Riverside. (December 2015, January 2016 and January 2017)

Professional Activities

Conference Services:
Co-organizer for the Joint Mathematics meetings, Boston, MA. (January 2023)
Co-organizer for the Joint Mathematics meetings, Seattle, WA. (January 2022)
Co-organizer for the AMS Western Sectional meeting, Riverside, CA. (November 2017)
Mentoring: Advisor for the UTRGV Graduate Mathematical Society. (2023); Organizer for the Putnam competition training. (2017); Peer-mentor for PhD students,

Washington University, St. Louis. (2013-2014); Lecturer at Math Circle, Washington University, USA. (February 2012)
Other Services Referee for J. Differ. Geom., J. Geom. Anal., Commun. Nonlinear Sci. Numer. Simul.; Reviewer for MathSciNet; Referee for S.-T. Yau High School Science Award.

LANGUAGES Chinese (native), English, German (basic)