

Chenwei (Peter) Ruan

Department of Mathematics
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Education

- **Ph.D. in Mathematics**, University of Wisconsin-Madison, Madison, United States, expected May 2024
Advisor: Paul Terwilliger
- **M.S. in Mathematics**, University of Wisconsin-Madison, Madison, United States, May 2018
- **B.S. in Mathematics**, Nanjing University, Nanjing, China, March 2017

Research Interests

- Algebraic combinatorics: distance-regular graphs, Terwilliger algebra, tridiagonal pairs, association schemes;
- Representation theory: quantum algebra, Askey-Wilson algebra, tridiagonal algebra, Lie algebra.

Awards and Honors

- UW-Madison Undergraduate Math Competition, Second Prize, University of Wisconsin-Madison, Madison, United States, 2016.

Publications

Refereed Journal Articles

- **C. Ruan**, A generating function associated with the alternating elements in the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$, *Commun. Algebra* 51 (2023) 1707-1720, [arXiv:2204.10223](https://arxiv.org/abs/2204.10223).

Preprints

- **C. Ruan**, A uniform approach to the Damiani, Beck, and alternating PBW bases for the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$, submitted to *J. Algebra Appl.* in July 2023, [arXiv:2305.11152](https://arxiv.org/abs/2305.11152).

Invited Conference Presentations

- *A uniform approach to the Damiani, Beck, and alternating PBW bases for the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (25 minutes)*, the 10th Slovenian Conference on Graph Theory, Minisymposium: Association Schemes and Related Algebras, Kranjska Gora, Slovenia, June 18–24, 2023

- *A generating function associated with the alternating elements in the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (45 minutes)*, the CRM workshop on Graph Theory, Algebraic Combinatorics and Mathematical Physics, Centre de Recherches Mathématiques, Montreal, Canada, July 25–August 19, 2022 (Online)
- *A generating function associated with the alternating elements in the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (30 minutes)*, the 16th International Symposium on Orthogonal Polynomials, Special Functions and Applications, Minisymposium: PhD and postdoctoral fellows, Centre de Recherches Mathématiques, Montreal, Canada, June 13–17, 2022 (Online)

Invited Seminar Talks

- *A uniform approach to the Damiani, Beck, and alternating PBW bases for U_q^+ (60 minutes)*, BIMSA Integrable Systems Seminar, Beijing Institute of Mathematical Sciences and Applications, Beijing, China, Dec 22, 2023
- *Distance-regular graphs and the positive part U_q^+ of the q -deformed enveloping algebra for affine \mathfrak{sl}_2 (60 minutes)*, Tohoku University Combinatorics Seminar, Tohoku University, Sendai, Japan, Dec 12, 2023 (Online)
- *Distance-regular graphs and the positive part U_q^+ of the q -deformed enveloping algebra for affine \mathfrak{sl}_2 (60 minutes)*, Wu Wen-Tsun Key Laboratory of Mathematics Combinatorics Seminar, University of Science and Technology of China, Hefei, China, Sep 27, 2023
- *A uniform approach to the Damiani, Beck, and alternating PBW bases for U_q^+ (50 minutes)*, UW-Madison Combinatorics Seminar, University of Wisconsin-Madison, Madison, United States, Dec 5, 2022 (Online)
- *Some elements in the quantum affine \mathfrak{sl}_2 algebra (50 minutes)*, UW-Madison Combinatorics Seminar, University of Wisconsin-Madison, Madison, United States, Feb 7, 2022 (Online)

Courses Taught

- **University of Wisconsin-Madison**

Teaching Assistant

- Math 221: Calculus and Analytic Geometry 1 Fall 2018, Fall 2021
- Math 320: Linear Algebra and Differential Equations Summer 2021
- Math 112: Algebra Spring 2021
- Math 211: Calculus Spring 2020, Fall 2020
- Math 213: Calculus and Introduction to Differential Equations Fall 2019
- Math 240: Introduction to Discrete Mathematics Spring 2019

Grader

- Math 475: Introduction to Combinatorics Summer 2021

Mathematical Outreach

- **Directed Reading Program**, University of Wisconsin-Madison, Madison, United States

The Directed Reading Program pairs undergraduate students with graduate mentors for semester-long independent studies. During the semester, I mentored a group of students who worked through a mathematical textbook. I held weekly discussions with the students. I also helped the students in preparing their presentations at the end of the semester.

- *Combinatorics Through Guided Discovery*, by Kenneth Bogart Spring 2018
- *Elements of Set Theory*, by Herbert Enderton Fall 2017
- *Abstract and Concrete Categories: The Joy of Cats*, by Jiri Adámek,
Horst Herrlich, George Strecker Spring 2017

- **Mega Math Meet**, University of Wisconsin-Madison, Madison, United States

The Math Meet is a mathematical competition for local students in fifth and sixth grades. The students form teams and compete at a regional meets. The first and second place teams qualify for a grand final called the Mega Math Meet, held at UW-Madison. I joined the group in writing the exam for Mega Math Meet in 2017 and was in charge of making one of the five problems.