Steppan Konoplev
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EDUCATION

2022-Present University of Delaware Department of Mathematical Sciences PhD student
Completed Master's degree requirements (qualifying exams & credits)
Current research interests: algebraic geometry, number theory, combinatorics

2019-2022 University of Maryland College Park (UMD) math major and CS minor
B.S. in Mathematics with High Honors
Science, Discovery, and the Universe (SDU) Scholars Program

PUBLICATIONS AND PREPRINTS

- Seriation of Samples of Regular Graphons: Ghandehari, M., Janssen, J., & Konoplev, S. (2023). In preparation
- A construction of non-Kahler CY 3-folds from singular K3 surfaces: Konoplev, S., Medel, J., & Russell, V. (2023). In preparation, journal TBD
- Cohomology of K3 surfaces: Konoplev, S., Medel, J., & Russell, V. (2023). To appear in *Note Di Matematica*
- On Alphatrion's Conjecture about Hamiltonian Paths in Hypercubes: Konoplev, S. (2019, December 22). arXiv. Retrieved from https://arxiv.org/abs/2002.02285
- Convergence of General Alternating Series: Konoplev, S. (2019). *CHS Math Journal*, 30–32.
    - drive.google.com/file/d/1dsfzjESEndIhoFnpD2aDSLmhU5w9qisb

PRESENTATIONS

- Geometry Topology Algebra: Philadelphia, Temple University, TBD, *Calculating Cohomology of singular K3 surfaces*
- MATH479 Problem Solving Seminar Invited Talk, UMBC, TBD 2023
- Graduate Student Intercollegiate Mathematics Seminar, Lehigh University, TBD 2023, *Probabilistic Method for solving Discrete Math Problems*
- Hallenbeck Graduate Seminar, University of Delaware, 20 February 2023, *Induction on the Real Numbers*
- Joint Mathematics Meetings, American Mathematical Society, 5 January 2023, *Calculating Cohomology of singular K3 surfaces*
- Hallenbeck Graduate Seminar, University of Delaware, 19 October 2022, *Probabilistic Method*

COMPETITIONS AND AWARDS

- 1st place in George Mason University Calculus Olympiad
- 1st place in 2022 New Jersey Undergraduate Math Competition
- Top 200 in 2021 Putnam Math Competition
- UMD comprehensive math honors exam all time high score
- 2021 IMC (International Math Competition) first prize, highest ranked U.S. student, 32nd/589
- 2021-2022 Maryland District 9 Senatorial Scholarship
- Top 50 in 2020 Putnam (based on score of 68/120 and 39 for top 100)
- 2020 IMC first prize
- 1st place in 2019 Virginia Tech Regional Mathematics Competition
- Top 200 in 2019 Putnam
- Lockheed Martin Challenge Box: Won Voyager Golden Record replica for solving challenging computer science problems
- Earned 3rd place in 2019 Howard County Hacks for customizable excuse generator

- 2nd place Calculus and 3rd place Combinatorics in 2019 John Hopkins Math Competition

RESEARCH AND PROJECTS

- **Pure Mathematics**
  - Reading course in projective geometry with Robert Coulter
    - Read chapters 1, 4-6 of *Projective Planes* by Hughes & Piper, solved exercises and made LaTeX of all chapter 4 exercises
    - Read relevant sections of Dembowski's & Zickert's projective geometry books
    - Resolved question about simplification of Lenz-Barlotti classification
  - Reading course in graph limits with Mahya Ghandehari
    - Read chapters 7-11, 13-14 of *Large Networks and Graph Limits* by Lovasz
    - Collaborated with Mahya and Jeannette Janssen to generalize *A Spectral Algorithm for Seriation* (1998) to graphons, resulting in a new paper
  - Researched complex algebraic geometry in Florida International University REU with professors Gueo Grantcharov and Anna Fino
    - Completed commutative algebra worksheets, learned basic material on K3 surfaces, and read papers on weighted projective space
    - Extended Iano-Fletcher's paper *Working with Weighted Complete Intersections* by calculating the cohomology of all K3 surfaces with A_n-type singularities
    - Presented results to other students and professors at end of REU
    - Improved presentation significantly, presented again at JMM
- **Statistical Modeling, Programming, and CAD designs**
  - Predicted the spread of nicotine usage through vaping and ranked harmfulness of various drugs based on economic losses
  - Created a model to predict food waste and a strategy to redirect excess food to shelters
  - Modeled an original difficult 5-piece cube puzzle, made animation of the solution; prototype deemed unsolvable by 8 people as everyone gave up within 20 minutes
  - Wrote 10 by 10 battleship AI that sinks all ships in an average of 44 moves
  - Programmed a marble sorter that routes marbles into 3 different bins based on radius
  - Created timekeeping device that flashes an LED to record end of race runner positions

TEACHING AND RELATED JOBS

Aug 2022-Present University of Delaware Math 241/242 TA
- Run discussion section, hold office hours every week, grade quizzes & exams

Aug 2021-May 2022 Gossett Student Athletic Center Tutor
- Tutored student athletes in upper-level undergraduate math courses including linear algebra and introduction to real analysis

Nov 2020-Feb 2022 Office of Multi-ethnic Student Education Tutor
- Tutored OMSE students in any 100 or 200 level math or computer science course
- Managed GroupMe group for efficient sharing of information during tutoring sessions

Aug 2021-Dec 2021 University of Maryland MATH 410 grader
- Graded assignments for a real analysis class and gave feedback on proof writing

Jan 2021-May 2021 University of Maryland MATH 310 grader
- Graded assignments in an introduction to proofs class and gave feedback on proof writing

OTHER PROFESSIONAL ACTIVITIES

- Quora math writer (2017-2021): Volunteered hundreds of hours of time to answer math questions on Quora, with 263 answers and 450k views (including content collapsed by bots)
  - https://www.quora.com/profile/Steppan-Konoplev-1

- Provided typesetting support, helpful clarifications, and constructive criticism to first time publishers as an editor of the 2019 Centennial High School Math Journal