# Batuhan Bayır

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## Education

3. **The University of Utah** (*Aug. 2023 — present*) — Ph.D. student in Mathematics
    - Advisors: Prof. Yekaterina Epshteyn and Prof. William M Feldman
2. **Ozyegin University** (*Sept. 2021 — July 2023*) — M.Sc. in Mathematics — CGPA is *3.90* over *4.00*
    - Thesis Title: Analysis of a fully discrete Fourier pseudospectral method for the Rosenau equation
1. **Ankara University** (*Sept. 2017 — June 2021*) — B.Sc. in Physics — CGPA is *3.63* over *4.00* — *Rank*: $1^{st}$ — *262/240* ECTS
    - Courses taken from the math dept. : Theory of Groups, Theory of Modules, Category Theory, Real Analysis Integral Equations, Differential Geometry, Differentiable Manifolds, Lie Groups, and History of Mathematics.

## Publications

1. Batuhan Bayir, Yekaterina Epshteyn, and William M Feldman, Global Well-Posedness of a Nonlinear Fokker-Planck Type Model of Grain Growth, arXiv:2502.13151 — February 2025
2. Bootstrap 3 for Beginners (Yeni Başlayanlar İçin Bootstrap 3) — January 2015
    - Bootstrap 3 is modern CSS framework for developing mobile device friendly websites. I wrote Türkiye's first Bootstrap 3 book when I was a 15 years old. Published by KODLAB in 2015. Book comes with supplementary DVD. Sample video on YouTube: (click).
      First Edition: Jan. 2015, Second Edition: Nov. 2015. ISBN (Softcover): 9786059118026. Sample pages in Google Books: (click).
3. Hermitian Matrices as a Complex Vector Space (unpublished note) — July 2020
    - In this short note, I am proving there exists a *complex* vector space structure on a set of Hermitian matrices via *Axiom of Choice*. ResearchGate page of the note: (click).

## Poster & Talks

1. A Fourier Spectral Method for the Rosenau Equation — Horizons in non-linear PDEs Summer School, 26-30 September 2022, Ulm University, Germany
    - I presented the first few results of my master's thesis in the poster session of summer school. In my thesis, I propose a numerical scheme for the *Rosenau equation* and do a convergence and stability analysis of the proposed scheme. Poster: (click).
2. Tautochrone Curve and Integral Equations — $9^{th}$ Bahar Mathematics Meeting, 1-2 May 2021, Zoom

- I talked about integral equations, Laplace transform and Tautochrone curve.
  Video of talk: (click) and slide of talk: (click).

3. Mathematics of Minkowski Spacetime — $6^{th}$ Bahar Mathematics Meeting, 19-20 October 2019, Hacettepe University *and* Ankara University MathCom Society Workshop, 10-11 July 2021, Zoom

   - I started with theory of bilinear forms, then I defined the Minkowski spacetime, and I proved some interesting geometric results on this space. Video of talk: (click) and slide of talk: (click).

4. Physical Aspects of Lie Theory — $5^{th}$ Bahar Mathematics Meeting, 2-3 March 2019, İstanbul Bilgi University

   - I started with defining some concepts such as group and manifold, then I talked about how Lie groups and Lie algebras appeared in classical and quantum physics.

5. A Brief Introduction to Lagrangian Mechanics — $4^{th}$ Bahar Mathematics Meeting, 13-14 October 2018, Middle East Technical University

   - I talked about variational problems and fundamentals of Lagrangian mechanics.

## Attended Schools & Conferences

1. Horizons in non-linear PDEs Summer School, 26-30 September 2022, Ulm University, Germany
2. Conference on Mathematics of Wave Phenomena, 14-18 February 2022, *Online*
3. Computation, Analysis and Applications of PDEs with Nonlocal and Singular Operators, 4-11 February 2022, *Online*
4. Turkish Mathematical Society Undergraduate & Graduate Summer School, 2019, Nesin Mathematics Village

   - I took 1-week courses on Category Theory (Matteo Paganin) and Bernoulli Polynomials (Mehmet Cenkci), 2-week course on Differential Geometry (Özgür Kişisel & İlker Berktav).

5. Turkish Women in Mathematics Graduate Summer School, 17-26 June 2019, Middle East Technical University

   - In this school we discussed the first ≈80 pages of Harris' Algebraic Geometry book. Lecturer was Özgür Kişisel.

6. Middle East Technical University Math Society Workshops
7. $7^{th}$ Cemal Koç Algebra Day, 27 April 2019, Bilkent University
8. Turkish Mathematical Society Undergraduate & Graduate Summer School, 2018, Nesin Mathematics Village

   - I took 1-week courses on Ring Theory (Ali Nesin), Lie Algebras (Şükrü Yalçınkaya), Manifolds & Special Holonomy (Özgür Kelekçi).

9. Nesin Mathematics Village Winter School, 2018

   - I took 2-week course on Module Theory (Ali Nesin).

10. Nesin Mathematics Village Summer School, 2017

- This summer school is offered for high-school students. I attended this school in my last year of high-school education. I took 2-week courses on Group Theory (Ali Nesin) and Ring Theory (Salih Durhan).

## Scholarships

- **Ozyegin University**, *Fellowship Package (Sept. 2021 — July 2023)*: Full tuition waiver, monthly net stipend, free dormitory room, and private health insurance.
- **Ozyegin University**, Travel grant for "Horizons in non-linear PDEs Summer School".
- **Ulm University**, Accommodation support for "Horizons in non-linear PDEs Summer School".

## Teaching Experience

- *Fall 2023 and Fall 2024*: Lab assistant for **MATH2250** Differential Equations and Linear Algebra at the University of Utah.

## Computer Skills

- HTML, CSS, and Bootstrap
- MATLAB and Python
- LaTeX
- Linux

## Languages

- Turkish (Native)
- English
- Arabic