Alperen Ali Ergür

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Education

2016 PhD in Mathematics - *Texas A&M University, USA*

2011 MS in Mathematics- *Tobb University, Turkey*

2009 BS in Mathematics- *Bilkent University, Turkey*

Employment

Aug 2020-present University of Texas at San Antonio
Assistant Professor
Mathematics Department

Sep 2019-Aug 2020 Carnegie Mellon University, Theoretical Computer Science Group
Postdoctoral Fellow
Mentors: Venkatesan Guruswami and Pravesh Kothari

May 2017-Aug 2019 Technical University of Berlin, Algorithmic Algebra Group
Einstein Postdoctoral Fellow
Mentors: Peter Bürgisser and Felipe Cucker

Aug 2016-May 2017 North Carolina State University, Symbolic Computation Group
Postdoctoral Research Scholar
Mentor: Cynthia Vinzant

Sep 2011-Aug 2016 Texas A&M University, Functional Analysis and Algebraic Geometry Groups
Graduate Research/Teaching Assistant, and REU Instructor
Mentors: Grigoris Paouris and J. Maurice Rojas

Teaching Experience

1. University of Texas at San Antonio

    - *Mentoring:*
      Jesus Rebollo-Bueno (postdoctoral scholar), Quinn Murphey (undergraduate student), Abigail Martinez (M.S. student)
    - *Courses developed for Mathematics of Data and Computing B.S. degree*
      Probability and Computing
      Introduction to Optimization (with C. Walton)
    - *Courses developed for grad students in Math, CS and Engineering*
      Probability Theory and Computing
      High Dimensional Probability with Applications to Data Science
    - *Instructor of the Record:*
      Linear Algebra, Probability and Computing, Abstract Algebra

2. Technische Universität Berlin

    - *Graduate Seminar:* Interior Point Methods in Convex Optimization (with T. de Wolff)
    - *Graduate Class:* Effective Algebraic Geometry (with P. Bürgisser, J. Tonelli-Cueto)
    - Worked closely with PhD students Josue Tonelli-Cueto and M. Levent Dogan

3. NC State University

    - Instructor of the Record for the following courses
      Linear Algebra for Science Majors, Calculus for Engineers, Precalculus

4. Texas A&M University

    - *Assistant Instructor at Research Experience for Undergraduates Program (REU)*
      Mentored eight undergraduate research projects in four summers: 2013-2016
    - Recitation Leader for Graduate Algebra, Probability, Advanced Calculus, Calculus

Grants, Awards, etc

July 2021	NSF-CCF-2110075, Algorithmic Foundations, recommended for funding in Fall 2021
	Title: Beyond Worst-Case Analysis for Computing with Polynomials
Jan 2017	Postdoctoral Fellowship by Einstein Foundation
Jun 2015	Travel Grants by University of Trento and Institut Henri Poincare
April 2014	AMS Travel Grant for Graduate Students
Sept 2009	Full Scholarship by Tobb University including tuition and stipend
Sept 2004	Full Scholarship by Bilkent University including tuition and stipend
< 2004	Two Bronze, One Silver Medal in National Math Competitions

Research Interest

Discrete and Convex Geometry, Real Algebraic Geometry, Convex Optimization,
Randomized Numerical Analysis, Theory of Computation

Publications and Preprints

Articles listed below are available at https://arxiv.org/a/ergur_a_1.html

1. Multihomogenous Nonnegative Polynomials and Sums of Squares
   Discrete & Computational Geometry, 2018
   https://doi.org/10.1007/s00454-018-0011-3

2. Probabilistic Condition Number Estimates for Real Polynomials I
   (with G. Paouris and J.M. Rojas)
   Foundations of Computational Mathematics, 2019
   https://doi.org/10.1007/s10208-018-9380-5

3. Approximating Nonnegative Polynomials via Spectral Sparsification
   SIAM Journal on Optimization, 2019
   https://doi.org/10.1137/17M1121743

4. Tropical Varieties for Exponential Sums (with G. Paouris and J.M. Rojas)
   Mathematische Annalen, 2020
   https://doi.org/10.1007/s00208-019-01808-5

5. On the Expected Number of Zeros of Random Fewnomials
   (with P. Bürgisser and J. Tonelli-Cueto)
   SIAM Journal on Applied Algebra and Geometry (SIAGA), 2019
   https://doi.org/10.1137/18M1228682

6. Smoothed Analysis for the Condition Number of Structured Real Polynomial Systems
   (with G.Paouris and J.M Rojas)
   Mathematics of Computation, 2021
   https://doi.org/10.1090/mcom/3647

7. On the Complexity of Plantinga-Vegter Algorithm
   (with F. Cucker and J. Tonelli-Cueto)
   ACM Symposium on Symbolic and Algebraic Computation (ISSAC), 2019
   https://doi.org/10.1145/3326229.3326252
   Under Review at Discrete & Computational Geometry

8. The Rank of Sparse Random Matrices
   (with A. Coja-Oghlan, Pu Gao, S. Hettereich, H. Rolvien)
   ACM Symposium on Discrete Algorithms (SODA), 2020
   https://doi.org/10.1137/1.9781611975994.35
   Minor Revision, Random Structures and Algorithms

9. The Multivariate Schwartz-Zippel Lemma
   (with L. Dogan, J. Mundo, E. Tsigaridas)
   Minor Revision, SIAM Journal of Discrete Mathematics

10. A Polyhedral Homotopy Algorithm for Real Zeros
    (with T. de Wolff)
    Under Review, Arnold Mathematical Journal

11. Functional Norms, Condition Numbers, and Numerical Algorithms in Algebraic Geometry
    (with F. Cucker, J. Tonelli-Cueto)
    Under Review, Forum Mathematics Sigma

Some Talks

Jul 2021 Mathematical Congress of Americas, Buenos Aires, Argentina

Jun 2021 Effective Methods in Algebraic Geometry, MEGA 2021, Tromso Norway

Sept 2020 Data Seminar, U Missouri Columbia

Mar 2020 ACO Seminar, Carnegie Mellon University

Jul 2019 SIAM Conference on Applied Algebraic Geometry 2019, Bern

Jun 2019 Effective Methods in Algebraic Geometry (MEGA) 2019, Madrid

Apr 2019 Computational Geometry Workshop, Schloss Dagstuhl, Germany

Feb 2019 Universität Bonn, Theoretical Computer Science Seminar

Nov 2018 Goethe Universität Frankfurt, Applied Discrete Mathematics Seminar

Oct 2018 U Missouri Columbia, Convex Geometry Seminar

Mar 2018 Emerging Trends in Geometric Functional Analysis, Banff Creativity Centre

Dec 2017 Methods on Discrete Structures Lecture Series, TU Berlin

Nov 2017 Algebra Meets Numerics Workshop, Berlin Academy of Sciences

Mar 2017 U Michigan Ann Arbor, Analysis and Probability Seminar

July 2016 Geometric Functional Analysis Concentration Week, Texas A&M

Apr 2016 MIT, LIDS Seminar

Apr 2016 Georgia Tech, Algebra Seminar

Mar 2016 Univ of Chicago, Scientific Computing Seminar

Mar 2016 NC State University, Symbolic Computation Seminar

Dec 2015 Colorado State University, FRAGMENT Seminar

Oct 2015 Technical University of Munich, Applied Geometry Seminar, Germany

Sept 2015 University of Athens, Convex Geometric Analysis Seminar, Greece

Service

2020+ Member of the Committee to design Mathematics of Computation and Data:
New B.S. degree jointly offered by Mathematics and Computer Science departments

July 2021 Organizer, Mathematical Congress of Americas Minisymposia:
Numeric-Symbolic Computation with Polynomials

July 2019 Organizer, SIAM Applied Algebraic Geometry Minisymposia:
Numerical Methods for Structured Polynomial System Solving

Fall 2017 Organizer, Algorithmic Algebra OberSeminar, TU Berlin

Feb 2016 Organizer, Lecture Series on Real Stable Polynomials, Bogazici University

Jan 2016 Organizer, Combinatorial Algebraic Geometry Workshop, Nesin Math Village

Nov 2014 Member of Power Team, Texas A&M High School Contest

References

Teaching

Timothee Bryan (Lecturer of Mathematics, George Mason University)

Amin Coja-Oghlan (Professor of Discrete Mathematics, Goethe Universität Frankfurt)

Felipe Cucker (Professor of Mathematics, City University of Hong Kong)

Pravesh Kothari (Assistant Professor of Computer Science, Carnegie Mellon University)

Grigoris Paouris (Professor of Mathematics, Texas A&M University)

J.Maurice Rojas (Professor of Mathematics and Computer Science, Texas A&M University)

Cynthia Vinzant (Assistant Professor of Mathematics, University of Washington, Seattle)