

Will Traves

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Recent Positions	United States Naval Academy (1999-Present) , Professor University of Maryland (2005-06, 2012-13) , Visiting Professor
Education	University of Toronto (1993 – 1998) , M.Sc. and Ph.D. in Mathematics Queen’s University (1989 – 1993) , B.Sc.H. in Mathematics
Research Interests	I am classically trained in Algebraic Geometry and Computational Commutative Algebra but my current research interests are exceptionally broad and include Rigidity Theory , Statistics , Operations Research (OR) , Artificial Intelligence and Machine Learning . I’m particularly interested in applying computational and algebraic tools to problems in rigidity theory and in linkage design.
Major Awards	PI, ONR Grant , Data Science at USNA (\$302K, 2020; \$99K, 2019) Ford-Halmos Award , Mathematical Association of America, 2014 Merten M. Hasse Award , Mathematical Association of America, 2009 Lester R. Ford Award , Mathematical Association of America, 2009 USNA Research Excellence Award , Dept. Nominee: 2007, 2008, 2011 Naval Academy Research Council Grant , 1999–2005, 2007, 2012 Defense Information Assurance Program Grant , 2011, 2012 Supported Visitor , Research Institute for Symbolic Computation, Austria, 2006 USNA Apgar Award for Excellence in Teaching , Honorable Mention, 2001 NSERC Postdoctoral Fellowship , 1998-2000 Daniel B. Delury Teaching Award , University of Toronto, 1996
Selected Institutional Service	Data Science at USNA : I lead the Academy’s Data Science group. We run a weekly interdisciplinary seminar and develop data science courses. I co-organized the Navy Data Sustainment Summit at USNA (June 2019). Department Chair (2014-2018) : I led the Mathematics Department, the largest department at USNA. Promotion and Tenure Committee (2013-14) : I served on the university-wide committee for one year, prior to becoming Chair of the Mathematics Department. Admissions Board (2008-2011) : I served three years on the board, which qualifies applicants for admission to the U.S. Naval Academy. Each year we had nearly 20,000 applicants for 1,250 spots. This activity required about 2 full days of work per week. Curriculum Committee Leadership : I served as the chair of the Majors Curriculum Committee in 2009 and 2010, during the deliberations that produced the current versions of our department’s majors. As well, I chaired the Division Curriculum Committee in 2010 and sat on the Yard-Wide Curriculum Committee that was responsible for reviewing a new Cybersecurity core course. Advising : I was the Senior advisor to several companies of midshipmen. I usually supervise several midshipmen in the mathematics major each year and I served one year as the Senior Advisor for the mathematics major.

Teaching and Mentoring Activities **Teaching:** I teach a variety of undergraduate mathematics classes at the United States Naval Academy, including Calculus, Data Science, Machine Learning and Artificial Intelligence, Linear Algebra, Introduction to Applied Math, Linear Programming, Integer Programming, Game Theory, the Quantitative Economics Capstone course, Statistics, and an Advanced Geometry class for 1/c midshipmen. I coordinated several core classes (Calculus II and III, Statistics) and classes for our majors (including Linear Algebra, Linear Programming, Introduction to Applied Math and Modern Algebra). The usual course load is 3/2 and significant amounts of time are required for extra instruction during office hours.

Mentoring Student Projects: As a faculty member at an undergraduate institution, I mentor many undergraduate projects. These range from students writing capstone papers (reports on published work in the literature) to honors projects (full semester undergraduate research courses) and Trident projects (full year research projects replacing 4 courses per semester). In the last ten years I supervised 4 Trident projects, 5 honors projects 11 capstone papers, and 2 independent research projects. Five of my students were minority students and three have gone on to studies at graduate school.

Selected Professional Activities **Project NExT:** Based on participation as a national Project NExT fellow (1999) and mentor (2005, 2011), I developed a regional program (spanning the MD-DC-VA area) to develop teaching effectiveness among new mathematics faculty and to encourage new faculty to share experiences with senior mentors. Fellows gather at the section's fall and spring meetings to discuss issues related to teaching and professional development.

MAA Executive Board: I was newsletter editor and secretary for the Executive Board of the MD-DC-VA section of the MAA from 2002-2006.

Conference Organization: I co-organized special sessions at meetings in Toronto (AMS sectional meeting, 2000), Montreal (CMS winter meeting, 2004), and Halifax (AMS sectional meeting, 2014).

Curriculum Review: I was the subject matter expert on a review of the Applied Math department at the Naval Postgraduate School in 2014 and in 2020. I served on a similar committee at the Royal Military College of Canada (2019).

Referee and Reviewer: Referee for a National Science Foundation and NSERC grant panels and 15 journals. Reviewer for Math Reviews.

Waverley Algebra Salon: Founding member of a math discussion group that meets monthly in Baltimore.

Selected Presentations **Combinatorics Seminar**, George Washington University, Washington, DC (2019)
Colloquium, George Mason University (2019)
Contributed Talk, MD-DC-VA MAA Section Meeting, Frederick, MD (2019)
Basic Notions Talk, USNA, Annapolis, MD (2019)
Special Session in honor of T.S. Michael, JMM, Baltimore, MD (2019)
Basic Notions Talk, USNA, Annapolis, MD (2018)
Special Session, SIAM Algebraic Geometry Meeting, Georgia Tech (2017)
Special Session, Joint Math Meetings, Washington, DC (2015)
Keynote Address, MD-DC-VA MAA Section Meeting, Roanoke, VA (2015)
Special Session, SIAM Algebraic Geometry Meeting, CSU, Colorado (2013)
RTG Workshop on Tensor Analysis, U.C. Berkeley (2012)
Special Session, AMS-SIAM Meeting, New Orleans, LA (2011)
Special Session, CMS Meeting, Ottawa, Canada (2008)
Research Institute for Symbolic Computation, Austria (2006)
Conference on Gröbner Bases, Tokyo, Japan (2005)
International Summer School on D-modules, Lisbon, Portugal (2005)
European Invariant Theory Conference, Göttingen, Germany (2003)

Colloquia and Seminar talks: USNA, St. Mary's College of Maryland, Drexel University/University of Pennsylvania, Haverford College/Bryn Mawr College, Dalhousie University, Queen's University, Howard University, Towson University, American University, U.C. Berkeley, University of Toronto, The University of Michigan, University of Nebraska (Lincoln), and the Fields Institute.

**Selected
Publications**

- [1] Will Traves. Data Science at USNA. *Mathematica Militaris*. (2019) 6 pages.
- [2] Jessica Sidman and Will Traves. The Grassmann-Cayley Algebra and Frameworks. *Handbook of Geometric Constraints Principles*, CRC Press. (2019), 85–106.
- [3] Will Traves. Book Review of J. Richter-Gebert's *Perspectives in Projective Geometry. A Guided Tour Through Real and Complex Geometry*. *American Mathematical Monthly*. **122** (2015), 398–402.
- [4] Will Traves. From Pascal's Theorem to d -Constructible Curves. *American Mathematical Monthly*. **120** (2013), 901–915.
- [5] Will Traves and Max Wakefield. Derivation radical subspace arrangements. *Journal of Pure and Applied Algebra* **215** (2011), no. 6, 1492–1501.
- [6] Karen Smith, Lauri Kahanpää, Pekka Kekäläinen, and William Traves. An invitation to algebraic geometry. *Springer-Verlag (New York)*, 2010, 224 pages. [Paperback edition of our book, originally published in 2000. It has since been translated into Persian and Finnish.]
- [7] Will Traves. Differential operators on Grassmann varieties. *Symmetry and spaces*, 197–207, *Progr. Math.*, **278**, *Birkhäuser Boston, Inc., Boston, MA*, 2010.
- [8] Andrew Bashelor, Amy Ksir and Will Traves. Enumerative algebraic geometry of conics. *American Mathematical Monthly* **115** (2008), no. 8, 701–728.
- [9] Kia Dalili, Sara Faridi, and Will Traves. The reconstruction conjecture and edge ideals. *Discrete Math.* **308** (2008), no. 10, 2002–2010.
- [10] Will Traves. Invariant theory and differential operators. *Gröbner bases in symbolic analysis*, 245–265, *Radon Ser. Comput. Appl. Math.*, **2**, *Walter de Gruyter, Berlin*, 2007.
- [11] Will Traves. Differential Operators on Orbifolds. *Journal of Symbolic Computation*. **41** (2006), 1295–1308.
- [12] Mutsumi Saito and Will Traves. Finite generation of rings of differential operators of semigroup algebras. *Journal of Algebra* **278** (2004), 76–103.
- [13] T.S. Michael and Will Traves. Independence Sequences of Well-Covered Graphs: Non-Unimodality and the Roller Coaster Conjecture. *Graphs and Combinatorics* **19** (2003), 403–411.
- [14] Will Traves. Localization of the Hasse-Schmidt Algebra. *Bull. Canadian Math. Society*. **406** (2003), 304–309.
- [15] Mutsumi Saito and Will Traves. Differential algebras on semigroup algebras. *Symbolic computation: solving equations in algebra, geometry, and engineering (South Hadley, MA, 2000)*, 207–226, *Contemp. Math.* **286**, *Amer. Math. Soc., Providence, RI*, 2001.
- [16] Will Traves. Tight Closure and Differential Simplicity. *Journal of Algebra*. **228** (2000), 457–476.
- [17] Will Traves. Nakai's Conjecture for Varieties Smoothed By Normalization. *Proc. American Mathematical Society* **127** (1999), 2245–2248.
- [18] Will Traves. Differential Operators on Monomial Rings. *Journal of Pure and Applied Algebra*. **136** (1999), 183–187.
- [19] Paul Embrechts, Agnes M. Herzberg, Heidi K. Kalbfleisch, Will Traves, and J. Robertson Whitla. An Introduction to Wavelets with Applications to Andrews' Plots. *Journal of Computational and Applied Math.* **64** (1995), 41–56.
- [20] Agnes M. Herzberg and Will Traves. An Optimal Experimental Design for the Haar Regression Model. *Canadian Journal of Statistics*. **22** (1994), 357–364.

References

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