Thomas Höft
Curriculum Vitae

University of St. Thomas
Department of Mathematics
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Professional Experience
- 2018–present: Associate Professor, University of St. Thomas (St. Paul, MN).
- 2012–2018: Assistant Professor, University of St. Thomas (St. Paul, MN).
- 2010–2012: Norbert Wiener Assistant Professor, Tufts University   *Computational inverse problems.*
- 2010: Guest Researcher, National Institute of Standards and Technology   *Fast computational methods.*
- 2005–2010: Senior Research Scientist, Lockheed Martin Coherent Technologies   *Imaging and modeling for laser radar.*

Education
- Ph.D. Applied and Industrial Mathematics (2005)   *University of Minnesota*   Minneapolis, MN
  "An inverse problem in nondestructive evaluation of spot-welds" Advisor: Dr. Fadil Santosa.
- M.S. Applied and Industrial Mathematics (2002)   *University of Minnesota*   Minneapolis, MN
  "Robust optimal design of an optical homogenizer" Advisor: Dr. Fadil Santosa.
- B.A. Physics, Mathematics, minor in Computer Science (1999)   *St. Olaf College*   Northfield, MN
  Graduated *summa cum laude* with departmental distinction in Physics.

Honors, Awards, Grants
- Major Research Instrumentation Grant (400k$), National Science Foundation 2020.
- Tier I Research Grant, University of St. Thomas Faculty Development Center 2015, 2016.
- National Science Foundation Graduate Research Fellowship 2000–2004.
- SIAM Student Travel Grant for Imaging Sciences 2004 Conference.
- Phi Beta Kappa 1999.

Teaching
- **University of St. Thomas Department of Mathematics, 2012–present.**
  Finite Mathematics, Calculus I, Calculus II, Multivariable Calculus, Intro. Differential Equations, Applied Math. and Modeling (Inverse problems in imaging).
- **Project NExT Fellow, Mathematical Association of America, 2011-2012.**
- **Tufts University Department of Mathematics, 2010–2012.**
  Calculus I, Applied Calculus II, Multivariable Calculus, Differential Equations.
- **Teaching Assistant, University of Minnesota School of Mathematics, 2000–2005.**
- **Laboratory Assistant, St. Olaf College Physics Department, 1996–1998.**

Research Mentoring
- **Math-to-Industry Boot Camps II–VII, Institute for Mathematics and its Applications, Summer 2017–2022:**
  Co-organizer, 2021–22; Faculty mentor to 21-32 mathematics Ph.D. students.
  [*2017*] [*2018*] [*2019*] [*2020*] [*Winter 2021*] [*2021*] [*2022*]
- **University of St. Thomas (UST), Summer 2016:** Center for Applied Mathematics (CAM).
  Faculty mentor, "Image de-blurring for spacecraft navigation." Liam Coulter (UST '17, Colo. State M.S. '20, U. MN EE Ph.D.).
- **UST, Fall 2014:** Center for Applied Mathematics.
  Faculty mentor, "Stochastic optimization and disk harmonics for deblurring in digital holography."
  Anne Fink (UST '16), Thomas Welle (UST '16, U. MN Physics Ph.D.).
- **MAXIMA REU, Institute for Mathematics and its Applications and Macalester College, 2014:** NSF-funded REU site.
  Faculty Advisor, "Robot learning by mimicking humans with KINECT sensors." [*link*]
  Jared Brown (St. Olaf '15, U. Wisc. BioStats Ph.D.), Christie Mauretour (Florida Gulf Coast '15, U. Florida Math Ph.D. '21),
    Julian Sass (UMBC '16, NCSU Ph.D. '22), Ziyue Shuai (Bryn Mawr '15, Columbia Stats M.A. '16).

Research Mentoring (continued)

- **UST, CSUMS 2014:** NSF-funded grant to Center for Applied Mathematics.
  Faculty mentor, "Atmospheric blur removal in digital holography: An optimization approach."
  Anne Fink (UST '16), Thomas Welle (UST '16).
- **MAXIMA REU, Institute for Mathematics and its Applications and Macalester College, 2013:** NSF-funded REU site.
  Faculty Advisor, "Recognizing and segmenting barcodes in images." [*link*]
  Mikaela Cashman (Coe College '14, Iowa State CS Ph.D. '20), Keenan Hawekotte (Nebraska Wesleyan '15, USC Math Ph.D. '21), Elizabeth Newman (Haverford '14, Tufts Math Ph.D. '19), Dũng Nguyễn (Bard & Columbia '16).

Service

- **Reviewer:** *SIAM J. Scientific Computing*, *IEEE Transactions on Computational Imaging*, *Journal of Computational Physics*, *Inverse Problems in Science and Engineering*.
- **Profession:**
  - Co-organizer, themed contributed paper session "Connecting introductory mathematics courses to students' intended majors and careers", MathFest (Chicago, IL), 2017.
  - Secretary / Treasurer, BIG SIGMAA (Business, Industry, Government Special Interest Group of the Mathematical Association of America) 2013–2017 (elected position; two terms).
- **University of St. Thomas:**
  Department of Mathematics
  - Hiring committees 2014, 2015, 2019, 2022.
  - Curriculum and course development committees 2012, 2013, 2014, 2016, 2017, 2019.
  University
  - University Technology Advisory Committee, 2013–2014, 2022-26.
  - Hiring committee, Mathematics Clinical Faculty, Daugherty Family College, 2021.
  - Intellectual Property Task Force, 2013–2017.

Publications

- J. M. Ennis‡, H. Thatcher‡, T. Calascione‡, J. Lu‡, N. Fischer‡, S. Ziemann‡, <u>T. Höft</u>, B. Nelson-Cheeseman "Effects of infill orientation and percentage on the magnetoactive properties of 3D printed magnetic elastomer structures" *Additive Manufacturing Letters* 4:100109, 2023.　　　　　　　　　[*preprint*] [*doi:*10.1016/j.addlet.2022.100109]
- S. Ziemann‡, N. Fischer‡, J. Lu‡, T. Lee‡, J. M. Ennis‡, <u>T. Höft</u>, B. Nelson-Cheeseman "Hard magnetic elastomers incorporating magnetic annealing and soft magnetic particulate for fused deposition modeling" *AIP Advances* 12:115305, 2022. *Featured as an "Editor's Pick."*　　　　　　　　　　　　　[*preprint*] [*doi:*10.1063/5.0119669]
- T. Lee‡, A. Morgenstern‡, <u>T. Höft</u>, B. Nelson-Cheeseman "Dispersion of particulate in solvent cast magnetic thermoplastic polyurethane elastomer composites" *AIMS Materials Science* 6:354–362, 2019.　　[*preprint*] [*doi:*10.3934/matersci.2019.3.354]
- T. Shepard, <u>T. Höft</u>, "Bubble measurement via Hough transform in highly overlapping conditions" *Proc. ASME-JSME-KSME 2019 8th Joint Fluids Engineering Conference* Paper No. AJKFluids2019-5223 V004T04A031, 2019.　　　　　[*preprint*] [*doi*]
- <u>T. Höft</u>, B. Alpert, "Fast updating multipole Coulombic potential calculation" *SIAM J. Scientific Computing* 39:A1038–A1061, 2017.　　　　　　　　　　　　　　　　　[*preprint*] [*doi:*10.1137/16M1096189]
- <u>T. Hoft</u> "Single image DC-removal method for increasing the precision of two-dimensional Fourier transform profilometry," U.S. Patent 8,605,150 issued 10 Dec. 2013.　　　　　　　　　　　　　　　　　　[*USPTO*]
- B. Redman, J. Novotny, T. Grow, V. Rudd, N. Woody, M. Hinckley, P. McCumber, N. Rogers, M. Hoening, K. Kubala, S. Shald, R. Uberna, T. D'Alberto, <u>T. Höft</u>, R. Sibell, F. Wheeler, "Stand-off Biometric Identification using Fourier Transform Profilometry for 2D+3D Face Imaging" *Optical Society of America Applications of Lasers for Sensing and Free Space Communications Conference Technical Digest* paper LThB3, 2011.　　　　[*preprint*] [*doi:*10.1364/LSC.2011.LThB3]
- B. Redman, J. Novotny, T. Grow, V. Rudd, N. Woody, M. Hinckley, P. McCumber, N. Rogers, M. Hoening, K. Kubala, S. Shald, R. Uberna, T. D'Alberto, <u>T. Höft</u>, R. Sibell, F. Wheeler, "2D+3D Face Imaging for Stand-off Biometric Identification" *CLEO Technical Digest* paper ATuF4, 2011.　　　　　　[*preprint*] [*doi:*10.1364/CLEO_AT.2011.ATuF4]
- B. Redman, J. Novotny, T. Grow, V. Rudd, N. Woody, M. Hinckley, P. McCumber, N. Rogers, M. Hoening, K. Kubala, S. Shald, R. Uberna, T. D'Alberto, <u>T. Höft</u>, R. Sibell, F. Wheeler, "Low-cost, stand-off, 2D+3D face imaging for biometric identification using Fourier transform profilometry – Update" *Proc. MSS Active E-O Systems*, 2010.　　　　　　　　[*preprint*]
- J. Marron, R. Kendrick, N. Seldomridge, T. Grow, <u>T. Höft</u>, "Atmospheric turbulence correction using digital holographic detection: experimental results" *Optics Express* 17:11638–11651, 2009.　　　　[*preprint*] [*doi:*10.1364/OE.17.011638]

Publications (continued)

- B. Redman, Sandalphon, <u>T. Höft</u>, T. Grow, J. Novotny, P. McCumber, N. Rogers, M. Hoening, K. Kubala, R. Havermann, R. Sibell, S. Shald, R. Uberna, "Low-cost, stand-off, 2D+3D face imaging for biometric identification using Fourier transform profilometry" *Proc. MSS Active E-O Systems*, 2009.   [*preprint*]
- B. Redman, J. Marron, N. Seldomridge, T. Grow, <u>T. Höft</u>, J. Novotny, S. Thurman, C. Embry, A. Bratcher, R. Kendrick, "Stand-off 3D face imaging and vibrometry for biometric identification using digital holography" *Proc. MSS Active E-O Systems*, 2009.   [*preprint*]
- R. Kendrick, R. Bell, T. Grow, <u>T. Höft</u>, J. Marron, N. Seldomridge, E. Smith, "Proposed digital holographic 3D mapping of coral beds" *Proc. SPIE* 7150:71500H1–71500H8, 2008.   [*preprint*] [*doi:*10.1117/12.804749]
- J. Marquardt, T. Baynard, <u>T. Höft</u>, B. Krause, M. Dehring, R. Nichols "Multispectral Laser Radar for Chem-Bio Detection" *Proc. MSS Active E-O Systems*, 2007.
- <u>T. Höft</u>, R. Kendrick, J. Marron, N. Seldomridge, "Two-wavelength digital holography" *Optical Society of America Digital Holography Conference Technical Digest* paper DTuD1, 2007.   [*preprint*] [*doi:*10.1364/DH.2007.DTuD1]
- J. Marron, R. Kendrick, <u>T. Höft</u>, N. Seldomridge "Novel multi-aperture 3D imaging systems" *Proc. 14th Coherent Laser Radar Conference*, 2007.   [*preprint*]
- J. Marquardt, R. Nichols, J. Wenzel, R. Sibell, <u>T. Höft</u>, J. V. Rudd, B. Krause, W. Garrett, K. Mahoney, A. Zakel "Polarization-sensitive lidar methods for biological agent detection" *Proc. Seventh Joint Conference on Standoff Detection for Chemical and Biological Defense*, 2006.   [*abstract*]
- R. Kendrick, <u>T. Höft</u>, J. Marron, J. Pitman, N. Seldomridge "Contour mapping of Europa using frequency diverse, spatial heterodyne imaging" *Proc. SPIE* 6361:6361F1–6361F7, 2006.   [*preprint*] [*doi:*10.1117/12.688393]
- [†]E. Francini, <u>T. Höft</u>, F. Santosa "An inverse problem in nondestructive evaluation of spot-welds" *Inverse Problems*, 22:645–661, 2006.   [*preprint*] [*doi:*10.1088/0266-5611/22/2/016]
- J. Cederberg, D. Olson, A. Nelson, D. Laine, P. Zimmer, M. Welge, M. Feig, <u>T. Höft</u>, N. London "Evidence for a nuclear hexadecapole interaction in the hyperfine spectrum of LiI" *J. Chem. Phys.* 110:2431–2436, 1999. [*preprint*][*doi:*10.1063/1.477972]

[†]Author order is alphabetic, not by contribution.

[‡]Undergraduate author.

Presentations

- "Measurement of gas bubble size in fluid flow" SIAM Computational Science and Engineering, Amsterdam (NL), Feb. 2023 (poster).
- "HDR image formation and response recovery via inverse problems" IEEE International Conference on Computational Photography, Evanston (IL), May 2016 (poster).
- "An introduction to Fourier transform based (3D) imaging with examples from industrial applications" Mathematics, Statistics, and Computer Science Colloquium, St. Olaf College, May 2016.
- "An introduction to Fourier transform based 3D imaging with examples from industrial applications" Mathematics Colloquium, Augsburg University, Jan. 2016.
- "Camera response function modeling for high dynamic range photography" Joint Mathematics Meetings, Seattle (WA), Jan. 2016.
- "The Fast Multipole Method, or how to use everyone's favorite calc II topic to solve hard problems" Math and Actuarial Science Club, University of St. Thomas, Apr. 2015.
- "Spectral noise filtering for Fourier transform profilometry" SIAM Computational Science and Engineering, Salt Lake City (UT), Mar. 2015 (poster).
- "Noise removal in Fourier transform profilometry" Joint Mathematics Meetings, San Antonio (TX), Jan. 2015.
- "Updating fast multipole methods for molecular simulations" Mathematics, Statistics, and Computer Science Research Seminar, St. Olaf College, Oct. 2014.
- "Recovery of the camera response function from few images in high dynamic range photography" SIAM Imaging Sciences 2014, Hong Kong (China), May 2014 (poster).
- "A 3-D face imaging method with applications to biometric identification" Joint Mathematics Meetings, Baltimore (MD), Jan. 2014.
- "An introduction to Fourier transform based 3D imaging with examples from industrial applications" Center for Applied Mathematics Colloquium, University of St. Thomas, Nov. 2013.
- "High-dynamic-range photography and inverse problems" Mathematics, Statistics, and Computer Science Research Seminar, St. Olaf College, Oct. 2013.
- "A mathematical journey from academe to industry and back again" Mathematics Colloquium, Augsburg College, Sep. 2013.

Presentations (continued)

- "Few-parameter camera response function recovery for high dynamic range photography" MAA MathFest, Madison (WI), Aug. 2012 (poster).
- "An inverse problem approach to high dynamic range photography" SIAM Imaging Sciences 2012, Philadelphia (PA), May 2012.
- "Optimization in Fourier imaging for laser remote sensing" Joint Mathematics Meetings, Boston (MA), Jan. 2012.
- "Fourier transform profilometry in industry: an application to 3-D face imaging" Math Society, Tufts University, Dec. 2010.
- "An introduction to two Fourier transform based 3D imaging modalities with examples from industrial applications" SIAM Student Chapter, Tufts University, Nov. 2010.
- "A regularization strategy for an inverse problem in thermal imaging" Tufts-Schlumberger Computational and Applied Math Seminar, Cambridge (MA), Nov. 2010.
- "Optimization strategies for formation and reconstruction of digital holography images" SIAM Imaging Sciences '08 Conference, San Diego (CA), Jul. 2008.
- "Two-wavelength digital holography for fine-resolution 3D imaging" Optical Society of America Digital Holography Conference, Vancouver (BC), May 2007.
- "An inverse imaging problem in nondestructive evaluation of spotwelds" SIAM Imaging Sciences '06 Conference, Minneapolis (MN), May 2006.
- "An inverse problem in nondestructive evaluation of spotwelds" Mathematics, Statistics, and Computer Science Research Seminar, St. Olaf College, May 2005.
- "Mathematical paw-prints: An introduction to inverse problems" Junior Colloquium, University of Minnesota School of Mathematics, Mar. 2005.
- "Vibro-thermography – A thermal imaging method for nondestructive spot weld evaluation" SIAM Imaging Sciences '04 Conference, Salt Lake City (UT), May 2004 (poster).
- "Robust optimal design of an optical homogenizer" First Annual Intermountain/Southwest Conference on Industrial and Interdisciplinary Mathematics, Utah State University, Feb. 2002 (poster).

Presentations as co-author

- "3D-printed magnetic elastomers: Identifying key structure & processing parameters for enhanced magnetoactive performance" B. Nelson-Cheeseman, J. M. Ennis[‡], J. Lu[‡], S. Ziemann[‡], N. Fischer[‡], T. Calascione[‡], T. Höft, Materials Research Society Fall Meeting, Boston (MA), Nov. 2022.
- "Magnetoactive properties of 3D printed magnetic elastomer structures – Effects of infill orientation and infill percentage" J. M. Ennis[‡], H. Thatcher[‡], T. Calascione[‡], J. Lu[‡], N. Fischer[‡], S. Ziemann[‡], T. Höft, B. Nelson-Cheeseman, Materials Research Society Fall Meeting, Boston (MA), Nov. 2022.
- "Impact of 3D printing extrusion on magnetically annealed high performance hard/soft magnetic elastomers" J. Lu[‡], N. Fischer[‡], S. Ziemann[‡], J. M. Ennis[‡], T. Höft, B. Nelson-Cheeseman, Materials Research Society Fall Meeting, Boston (MA), Nov. 2022 (poster).
- "3D-printed magnetic elastomers: Parameters to achieve large and complex magnetoaction" B. Nelson-Cheeseman, J. M. Ennis[‡], J. Lu[‡], W. Howell[‡], S. Ziemann[‡], T. Höft, 67th Annual Conference on Magnetism and Magnetic Materials, Minneapolis (MN), Nov. 2022.
- "Magnetoactive properties of biocompatible magnetic hydrogel composites: Effects of magnetic particulate type and magnetic annealing" J. Schewe[‡], J. M. Ennis[‡], J. Lu[‡], W. Howell[‡], D. Fagan[‡], T. Höft, B. Nelson-Cheeseman, 67th Annual Conference on Magnetism and Magnetic Materials, Minneapolis (MN), Nov. 2022 (poster).
- "Magnetoactive properties of 3d printed magnetic elastomer structures: Effects of infill orientation and infill percentage" J. M. Ennis[‡], H. Thatcher[‡], T. Calascione[‡], J. Lu[‡], N. Fischer[‡], S. Ziemann[‡], T. Höft, B. Nelson-Cheeseman, 67th Annual Conference on Magnetism and Magnetic Materials, Minneapolis (MN), Nov. 2022 (poster).
- "Impact of 3D printing extrusion on magnetically annealed high performance hard/soft magnetic elastomers" J. Lu[‡], N. Fischer[‡], S. Ziemann[‡], J. M. Ennis[‡], T. Höft, B. Nelson-Cheeseman, 67th Annual Conference on Magnetism and Magnetic Materials, Minneapolis (MN), Nov. 2022 (poster).
- "Complex magnetoactuation of 3D-printed hard magnetic elastomers: Effects of infill orientation and percentage" W. Howell[‡], J. Ennis[‡], D. Fagan[‡], J. Schewe[‡], T. Höft, B. Nelson-Cheeseman, 67th Annual Conference on Magnetism and Magnetic Materials, Minneapolis (MN), Nov. 2022 (poster).
- "Bubble measurement via Hough transform in highly overlapping conditions" T. Shepard, T. Höft, 8th Joint Fluids Engineering Conference, San Francisco (CA), Jul. 2019.

First author is presenter.

Presentations as co-author (continued)

‡Undergraduate author.