

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Aerospace Engineering

Alex A. Gorodetsky, assistant professor of aerospace engineering, Department of Aerospace Engineering, College of Engineering, is recommended for promotion to associate professor of aerospace engineering, with tenure, Department of Aerospace Engineering, College of Engineering.

Academic Degrees:

Ph.D. 2017 Massachusetts Institute of Technology, Aerospace Engineering, Cambridge, MA
M.S. 2012 Massachusetts Institute of Technology, Aerospace Engineering, Cambridge, MA
B.S. 2010 University of Michigan, Aerospace Engineering, Ann Arbor, MI

Professional Record:

2018 – present Assistant Professor, Department of Aerospace Engineering, University of Michigan
2016 – 2017 John von Neumann Post-Doctoral Research Fellow, Sandia National Laboratories, Albuquerque, NM

Summary of Evaluation:

Teaching: Professor Gorodetsky has successfully taught two required undergraduate courses: AE341-Aircraft Dynamics (major course revision) and AE470-Control of Aerospace Vehicles, and a graduate course that he developed which has grown in popularity: AE567-Inference, Estimation, and Learning. He has graduated one Ph.D. student and has another seven in progress (two as co-chair). In addition, he is a member of several Ph.D. committees. Professor Gorodetsky has advised 14 masters students and eight undergraduate students. He has also been involved in mentoring students in the MDP program since 2021.

Research: Professor Gorodetsky has established an outstanding research record centered on fundamental issues of decision making under uncertainty. He researches methods to enable rapid solutions of forward and inverse problems specifically addressing those cases that are computationally too expensive for traditional analysis. His methods lie in three thrusts: uncertainty quantification, Bayesian learning, and machine learning in the presence of sparse and noisy data. The application of his work is in the general area of autonomous systems. His key contributions are in Bayesian estimation and learning in dynamical systems which has advanced the state of the art in accounting for uncertainties, in optimization schemes for low-rank tensor networks that enable highly efficient learning when the number of inputs is large and the amount of data is small, and in multi-fidelity uncertainty quantification leading to an order of magnitude reduction in computational expense. Professor Gorodetsky's work has been published in the top outlets in his field. His research has been supported by the DOD, DOE, NSF, and NASA with his share of funding at approximately \$4M. He has received both the NSF CAREER as well as

the AFOSR Young Investigator awards. He has another healthy set of pending proposals that should allow him to grow his research program even further.

Recent and Significant Publications:

- Soley, B., Bergold, P., Gorodetsky, A.A., and Batista, V.S., “Functional Tensor-Train Chebyshev Method for Multidimensional Quantum Dynamics Simulations,” *Journal of Chemical Theory and Computation*, 18:1 (2022): 25-36
- Pham, T. and Gorodetsky, A. A., “Ensemble Approximate Control Variate Estimators: Applications to MultiFidelity Importance Sampling,” *SIAM/ASA Journal on Uncertainty Quantification*, 10:3 (2022): 1250-1292.
- Kachar, K.G. and Gorodetsky, A. A., “Dynamic Multi-agent assignment via discrete optimal transport,” *IEEE Journal on Control of Network Systems*, (2022).
- Gorodetsky, A. A., Safta, C. and Jakeman J.D., “Reverse-mode differentiation in arbitrary tensor network format: with application to supervised learning,” *Journal of Machine Learning Research*, 23:143 (2022): 1-29.
- Galioto, N. and Gorodetsky, A.A., “Bayesian system ID: optimal management of parameter, model, and measurement uncertainty,” *Nonlinear Dynamics* (2020).

Service: Professor Gorodetsky has served his profession well through organizing symposiums, reviewing for journals and agencies, chairing sessions and providing open-source software. He has also served as a student paper chair for AIAA. He has served on AERO’s curriculum related committees and the strategic planning committee. He is a volunteer for the first-generation engineers and sat on a university wide panel answering questions on first generation issues. Other activities include serving on the committees for computing, faculty search, strategic planning, and scholastic standing. He served as an MPACE panel member for post-doctoral scholars looking for faculty positions, NextProf Faculty volunteer, and judge for the Richard and Eleanor Towner Prize for Outstanding Ph.D. at the Engineering Graduate Symposium.

External Reviewers:

Reviewer A: “He understands the fundamental challenges facing science today: insufficient models and data, and the need for probabilistic and accurate surrogates to achieve necessary predictive credibility. His work has aimed at addressing the bottlenecks in this paradigm, introducing transformative ideas related to tensor trains and multi-fidelity models.”

Reviewer B: “...Dr. Gorodetsky has made a name for himself doing rigorous and careful work on challenging problems in uncertainty quantification for dynamical systems, and has received recognition through highly competitive early career awards from AFOSR and NSF. I enthusiastically and without reservation support his case for promotion to associate professor with tenure in UM’s Aerospace Engineering Department.”

Reviewer C: “Based on the evidence presented, my experience with the research field, I do believe that Prof. Gorodetsky meets the standard for promotion in a leading institution such as University of Michigan....Prof. Gorodetsky is one of the leaders [of his cohort] in his field and I am convinced that his contributions will position him at the very top of the community.”

Reviewer D: "...in my opinion he is worthy of this rank in any of the best Departments in the country, and I would consider myself fortunate to be his colleague...He has originality and vision, he sets very high standards for himself and his students, he is nationally and increasingly internationally recognized, he is a true teacher-scholar – the best of what one may expect from a rising star [of his cohort] at this stage in their career."

Reviewer E : "Alex is undoubtedly one of the elite rising stars. ... I consider Alex THE best researcher [of his cohort] in CSE worldwide...I therefore support Prof. Alex Gorodetsky's promotion to the rank of Associate Professor with Tenure in the strongest possible terms."

Summary of Recommendation: Professor Gorodetsky has developed an outstanding record and has demonstrated potential in all areas of research, teaching, and service. It is with the support of the College of Engineering Executive Committee that I recommend Alex A. Gorodetsky for promotion to associate professor of Aerospace Engineering, with tenure, Department of Aerospace Engineering, College of Engineering.



Steven L. Ceccio, Ph.D.
Interim Dean of Engineering
Vincent T. and Gloria M. Gorguze Professor of
Engineering
College of Engineering

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