

Youssef Marzouk – Colloquium Seminar – October 24, 2024  
MIT

"Formulations, computations, and open questions in optimal experimental design"

Questions of "how best to acquire data" are essential to modeling and prediction in science, engineering, and beyond. Optimal experimental design (OED) formalizes these questions and creates computational methods to answer them. This talk will present a broad survey of modern OED, from its decision- and information-theoretic foundations to computational methods for evaluating and optimizing optimal design criteria in complex models. We will also discuss several questions at the research frontier, related to optimal design in high dimensions and in the presence of model misspecification. Content is based on the recent survey [Huan, Jagalur, & Marzouk; arXiv:2407.16212; Acta Numerica 2024].

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Youssef Marzouk is the Breene M. Kerr (1951) Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology (MIT), and co-director of the Center for Computational Science and Engineering within the MIT Schwarzman College of Computing. He is also a core member of MIT's Statistics and Data Science Center and a PI in the MIT Laboratory for Information and Decision Systems (LIDS).

His research interests lie at the intersection of statistical inference, computational mathematics, and physical modeling. He develops new methodologies for uncertainty quantification, Bayesian computation, and machine learning in complex physical systems, motivated by a

broad range of engineering and science applications. His recent work has centered on algorithms for inference, with applications to data assimilation and inverse problems; dimension reduction methodologies for high-dimensional learning and surrogate modeling; optimal experimental design; and transportation of measure as a tool for inference and stochastic modeling.

He received his SB, SM, and PhD degrees from MIT and spent four years at Sandia National Laboratories before joining the MIT faculty in 2009. He is also an avid coffee drinker and an occasional classical pianist.