

# Simulation-based Bayesian inference and surrogate modeling

**Y. Marzouk**<sup>1</sup>

<sup>1</sup>*Massachusetts Institute of Technology, Cambridge*

Many practical Bayesian inference problems fall into the simulation-based or "likelihood-free" setting, where evaluations of the likelihood function or prior density are unavailable or intractable; instead one can only draw samples from the joint parameter-data prior. Learning conditional distributions is essential to the solution of these problems. To this end, I will discuss a powerful class of methods for conditional density estimation and conditional simulation based on transportation of measure, and elucidate links between these methods and surrogate modeling. An important application for these methods lies in data assimilation for dynamical systems, where transport enables new approaches to nonlinear filtering and smoothing. I will also present new results on the joint dimension reduction of data and parameters in data assimilation and other non-Gaussian inference problems.

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