# PARAMETRIC PDES: THE IMPORTANCE OF ADAPTIVITY

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In engineering applications (heat transfer, fluid flow etc), we often encounter physics-based models consisting of partial differential equations (PDEs) with uncertain (or random) inputs, which can be reformulated as parametric PDEs. Solutions of such problems are functions of space, time (if time-dependent) and the chosen input parameters. In the field of Uncertainty Quantification (UQ), we model uncertain inputs as random variables. Given a probability distribution for the inputs, the associated forward problem involves estimating statistical quantities of interest related to the PDE solution.

Over the last two decades, many numerical schemes have been developed in the numerical analysis community to tackle forward and inverse UQ problems involving parametric PDEs. However, approximating solutions to such problems accurately and efficiently on the associated space, time and parameter domains is highly challenging. Adaptive solution algorithms are essential. In this talk, I will demonstrate the need for and importance of adaptivity when solving parametric PDEs numerically and discuss some of the associated mathematical challenges.