1125-65-3155 **Roger Ghanem*** (ghanem@usc.edu), University of Southern California. *Recent advances in probabilistic modeling for multiscale and multiphysics problems.*

Complex systems whose driving mechanisms cannot be easily learned from observations of their behavior are ubiquitous. Two important issues must generally be addressed when using probabilistic methods to tackle these problems. First, the specific probabilistic models adopted will themselves bias inferences in often unclear fashion. This refers both to prior models and to knowledge updating mechanisms. Second, a probabilistic approach, by necessity, embeds a given problem in a statistical ensemble of problems, typically increasing the analytical or computational requisite for solving the problem. This talk will describe recent advances in adapting the polynomial chaos methodologies for handling coupled interacting systems, with probabilistic constraints and parameters. This approach addresses both challenges alluded to above while, at the same, presenting a consistent mathematical formalism for analysis. The approach is based on polynomial chaos decompositions that provide a characterization of random variables (or random processes) as functional forms in terms of other, underlying, fluctuations that can be thought of as causing the randomness of interest. This hierarchical decomposition is consistent with multi-physics, multi-scale and multi-disciplinary paradigms. (Received September 23, 2016)