



## **Exploiting models of different complexities for state and parameter estimation**

Balasubramanya Nadiga and David Wolpert

Los Alamos National Lab., Los Alamos, United States (balu@lanl.gov; dwolpert@lanl.gov)

Different types of models and hierarchies of models in terms of the amount of detail represented play a central role in developing our understanding of a complex system. However, at present, there is no framework that can combine integrations of disparate model types and integrations of models at different levels of hierarchy to improve predictive capabilities. For example, present approaches to data-assimilation are incapable of working simultaneously with multiple models. We seek to develop methods that can objectively combine multiple sources of information to solve state and parameter estimation problems where each information source is modeled as a stochastic process. In preliminary work, we consider the problem of parameter estimation in the Lorenz, 1996 two-scale model. When only one information source is used, the estimation is ineffective and the confidence in the predictions is low; the range of variability displayed by the predictions is excessive. Improvements in predictions on considering an additional (lower-fidelity) information source is demonstrated.