



## **Partial Differential Equations for Ocean Uncertainty Prediction and Nonlinear Data Assimilation**

Pierre P.F.J. Lermusiaux, Themistoklis P. Sapsis, Thomas Sondergaard, and Mattheus P. Ueckermann  
MIT, Mechanical Engineering, Cambridge, MA 02139, United States (PIERREL@MIT.EDU, 001-617-49)

Stochastic partial differential equations for ocean uncertainty prediction are obtained, based on dynamically orthogonal field equations and adaptive subspaces. These equations provide prior probabilities for novel nonlinear data assimilation methods which are derived and compared. New adaptive sampling schemes are also discussed. Examples are provided using two-dimensional ocean and fluid flows.