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Computer Science : Data Mining and Knowledge Discovery

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# Forecast Error Correction using Dynamic Data Assimilation

- Introduces the reader to a new method of dynamic data assimilation called **Forward Sensitivity Method (FSM)** through theory and application
- The connection between the FSM and the well-known adjoint sensitivity or **four-dimensional variational (4D-Var)** method is clarified
- The predictability limit of a dynamical model as an outcome of FSM is established
- FSM and 4D-Var assimilation methods are demonstrated through problem solving with **low-order dynamical systems and a real-world meteorological problem**

This book introduces the reader to a new method of data assimilation with deterministic constraints (exact satisfaction of dynamic constraints)—an optimal assimilation strategy called **Forecast Sensitivity Method (FSM)**, as an alternative to the well-known four-dimensional variational (4D-Var) data assimilation method. 4D-Var works with a forward in time prediction model and a backward in time tangent linear model (TLM). The equivalence of data assimilation via 4D-Var and FSM is proven and problems using low-order dynamics clarify the process of data assimilation by the two methods. The problem of return flow over the Gulf of Mexico that includes upper-air observations and realistic dynamical constraints gives the reader a good idea of how the FSM can be implemented in a real-world situation.

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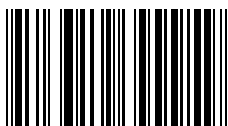
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