

# The Institute of Computational and Theoretical Studies: Data Assimilation Program

## *Lecture 1: Numerical Weather Prediction: Chaos, Predictability, and Data Assimilation*

## *Lecture 2: Data Assimilation Toward Big Data and Post-Peta-Scale Supercomputing: A Personal Perspective*

Speaker Prof. Takemasa Miyoshi  
: RIKEN Advanced Institute for Computational Science  
Japan

Date 20 April 2015 (Monday)

Time 10:00 a.m. - 11:00 a.m. (Lecture 1)  
: 11:30 a.m. - 12:30 p.m. (Lecture 2)

Venue FSC1217  
: Fong Shu Chuen Library  
HSH Campus  
Hong Kong Baptist University

### **Abstract:**

#### **Lecture 1: Numerical Weather Prediction: Chaos, Predictability, and Data Assimilation**

This lecture provides an introduction to numerical weather prediction with more emphasis on data assimilation. The weather system is chaotic, and data assimilation plays a central role in synchronizing a numerical simulation to the chaotic nature. Data assimilation integrates simulations (i.e., virtual world on computers) and real-world data based on statistical mathematics and brings synergy.

#### **Lecture 2: Data Assimilation Toward Big Data and Post-Peta-Scale Supercomputing: A Personal Perspective**

This lecture discusses my personal perspective on the next 10-20 years of data assimilation with the future-generation sensors and post-peta-scale supercomputers. New sensors produce orders of magnitude more data than the current sensors, and faster computers enable orders of magnitude more precise simulations, namely, "Big Simulations". Data assimilation deals with the "Big Data" from both new sensors and Big Simulations. We started a "Big Data Assimilation" project, aiming to develop a revolutionary weather forecasting system to refresh 30-minute forecasts at a 100-m resolution every 30 seconds, 120 times more rapid than the current hourly-updated systems. We also investigate ensemble data assimilation using 10240 ensemble members, largest ever ensemble for the global atmosphere. Based on our experience using the Japanese 10-petaflops "K computer", we will discuss the future of data assimilation in the Big Data and Big Simulation era.

The Data Assimilation Program is organized by the Centre for Mathematical Imaging and Vision.

– *All interested are welcome* –

For further information, please visit <http://www.math.hkbu.edu.hk/>, or call 3411-5056.