

Special Program in Applied Mathematics and Applied Mechanics

*A Multi-scale Imaging-based Cluster Analysis and Cluster-guided CFD analysis with
Applications to Asthmatics and COPD Populations*

Prof. Ching-Long Lin

2017 - 12 - 21 (Thu.)

10:30 - 12:00

308, Mathematics Research Center Building (ori. New Math. Bldg.)

In this talk, I will present a computational framework that is composed of a multi-scale imaging-based computational fluid dynamics (CFD) lung model and a computed-tomography (CT) multi-scale imaging-based cluster analysis (MICA) that bridges individual and population scales for precision medicine. The ultimate goals of the research are three-fold: (1) understanding the lung structure and function relationship at both global and local levels, (2) developing sensitive techniques to assess lung function and predict particle transport, (3) improving our ability to detect the onset, progression, and location of pulmonary disorders in sub-populations (viz. clusters). I will review the challenges overcome to perform CT big data analysis in a multi-center setting, and demonstrate how to use cluster membership to guide CFD analysis in asthmatics and Chronic Obstructive Pulmonary Disease (COPD) sub-populations for improved drug delivery and tailored treatment.



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