

中央研究院統計科學研究所

學術演講

講題：Advances in multi-fidelity computer experiments with tuning parameters

演講人：Prof. Chih-Li Sung (宋治立 教授)

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時間：2025-05-07 (Wed.) 10:30-12:00

地點：Auditorium, B1F, Institute of Statistical Science; The tea reception will be held at 10:10.

備註：Online live streaming through Cisco Webex will be available.

Abstract

Simulating complex physical systems can be computationally expensive, particularly when using high-fidelity models like finite element methods. This talk presents our recent work on multi-fidelity surrogate modeling for such simulations, with a focus on tuning parameters that control fidelity levels. In the first part, I introduce an adaptive non-stationary kernel that explicitly incorporates the fidelity parameter, enabling inference at unobserved fidelity levels. This is combined with a sequential design strategy based on the integrated mean squared prediction error (IMSPE) to efficiently select design points that balance predictive accuracy and computational cost. In the second part, I present the Diffusion Non-Additive (DNA) model. Inspired by recursive structures in generative diffusion models, DNA incorporates lower-fidelity outputs as inputs at higher levels, allowing it to capture non-additive, non-linear relationships across fidelities. This flexible framework supports efficient inference through closed-form posterior predictions.



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