

Colloquium

Partial Differential Equations with Random Effects

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地 點：應用數學系多媒體教室（理 408 室）

摘 要：

Given a time-dependent partial differential equation, the evolution of the solution is determined by its initial data. Due to errors caused by measurements, we cannot identify the one that will actually materialize in an experiment, which motivates us to model the initial data by random fields and analyze the distribution of the solution.

In the first part of this talk, we will show how to use the spectral representation method, the Hermite expansion, and the multiple Wiener integrals to classify the limiting distribution of the random solution field. We found that when the strength of long range dependence of the random initial data exceeds some threshold, the rescaled solution will converge to a non-Gaussian field. And there is a competition relationship between the effects on the solution induced by the random initial data.

In the second part of this talk, we will show how to use the turbulence models to formulate the random effects on Maxwell's equations caused by the thermal fluctuation and apply the Fourier analysis and the Wiener integrals to analyzing the random electromagnetic fields and their scaling limits. The contents of this talk are contained in [1] and [2].

References

- [1] Multi-scaling limits for relativistic diffusion equations with random initial data, Transactions of the American Mathematical Society (2014). Accepted and to appear.
- [2] Stochastic Wave Propagation in Maxwell's Equations, Journal of Statistical Physics (2014). Accepted and to appear.