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New waves, PDEs, and coarse-grained stochastic lattice models for the tropics

One of the most important and prototype multi-scale systems involves a comprehensive model for the coupled atmosphere ocean system for both climate change and longer term weather prediction. One of the striking recent observational discoveries is the profound impact of variations in the tropics on all of these issues. The talk has four parts:

(1) an introduction to these issues;

(2) novel behavior of waves in the simplest tropical climate models and their mathematical analysis compared/contrasted with relaxation limits and combustion waves;

(3) systematic mathematical strategies for coarse graining stochastic lattice models for both material science and climate physics;

(4) application of (3) to show the dramatic effect in simple tropical climate models of stochastic effects on both the climatology and fluctuations.