4th Latin American SCAT Workshop

Facultad de Ciencias Físicas y Matemáticas

Universidad de Chile

Satellite School on Numerical Methods — 29 Sept. to 3 Oct. 2008

Phase Transition in Disordered Systems: electrical properties, epidemics, forest fires.

Lecturer:

Prof Jean Pierre Clerc, Université d'Aix en Provence, Marseille

Duration

6 hours.

Description

After a review of second-order phase transitions (homogeneous functions, critical exponents, universality, re-normalization and Ising's model), the model of percolation and its application in the determination of electric properties of composite materials will be presented. The modeling of phenomena which include long-range connections (e.g., epidemics and forest fires) lead to the development of a new class of stochastic models: the small-world network (SWN) models.

The elaboration of a local SWN model and its validation by comparison with real fire data (fire patterns, fractal dimension, burned area, satellite images) are presented. The good agreement observed opens new perspectives in the simulation of such erratic systems. In addition to its capacity to mimic the phenomena of fire spread in nature, the SWN model produces super-real-time simulations of fire patterns, providing the basis of an operational tool for emergency and land management services.

For more information, visit www.scat-alfa.eu

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