Special issue

Statistical mechanics of irreversible stochastic models-II

Foreword

This is the second special issue of the Brazilian Journal of Physics devoted to the statistical mechanics of irreversible stochastic models. The present issue, as much as the first (Braz. J. Phys., Vol. 30, number 1), includes contributions of many renowned researchers on nonequilibrium statistical mechanics from around the world.

The approach emphasized in this issue is one in which nonequilibrium systems are described by lattice models that evolve in time according to an irreversible stochastic dynamics, which may be continuous (leading to a master equation), or discrete, as in the case of probabilistic cellular automata. A fundamental characteristic of the problems studied here is that nonequilibrium stationary states asociated with irreversible models do not obey the detailed balance condition, so that many of the methods of equilibrium statistical mechanics do not apply.

The reader will find both review articles and articles presenting new results in the context of earlier studies. Among them are works on subjects of great current activity, such as stochastic lattice models for population dynamics, models for catalytic chemical reactions, interface growth, dynamics of vitreous systems, self-organized criticality and analyses of the critical behavior of intrinsically irreversible models possessing absorbing states. Many of the articles collected here use dynamic mean-field analyses and/or exact solutions of stochastic irreversible models, as well as numerical simulation.

We believe that the present issue furnishes a good overview of contemporary research in the area of nonequilibrium statistical mechanics, within the context of stochastic lattice models. We hope it will be useful for students and researchers interested in the subject, and become a point of reference in the area, both in Brazil and around the world.

We are very glad to have had the opportunity of organizing this Special Issue. We are most grateful to Professor Silvio R. Salinas, the Editor of the Brazilian Journal of Physics, for having proposed it, and to all of the authors for their timely and well written contributions.

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Guest Editors