CICLO DE SEMINARIOS 2012

SMAT-C Soft Matter Research and Technology Center

"Two traffic models with passing"

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In the first model cars either move freely with quenched intrinsic velocities or belong to clusters formed behind slower cars. In each cluster, the next-to-leading car is allowed to pass and resume free motion. The model undergoes a phase transition from a disordered phase for the high passing rate to a jammed phase for the low rate. In the disordered phase, the cluster size distribution decays exponentially in the large size limit. In the jammed phase, the distribution of finite clusters is independent on the passing rate, but it accounts only for a fraction of all cars; the "excessive" cars form an infinite cluster moving with the smallest velocity. Mean-field equations, describing the model in the framework of Maxwell approximation, correctly predict the existence of phase transition and adequately describe the disordered phase; properties of the jammed phase are studied numerically.

The second model consists of particles moving on a line in the same direction. Passing is allowed and when a fast particle overtakes a slow particle, it acquires a new velocity drawn from a distribution PO(v), while the slow particle remains unaffected. We show that the system reaches a steady state if PO(v) vanishes at its lower cutoff; otherwise, the system evolves indefinitely.

Martes 10 ABRIL 2012, 13:00 horas

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