Generation of cultural map of 81 societies with economic zones superimposed

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There exists [1] a cultural map of 81 societies (countries), with economic zones superimposed, which reflects the responses to scores of questions, given by over 200,000 respondents in all continents in the period 1999-2002. This map is given in terms of the following two-dimensions (2D); i) traditional authority vs. secular-rational authority and ii) survival values vs. self-expression values.We try to reproduce the main features of this empirical map by making use of a fuzzy linear space in which each of the vector coordinates represent selected variables such as degree of industrialization, political regime, gap between rich and poor, cultural and religious traditions, etc.

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Driven two-dimensional Lennard-Jones fluid

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As in equilibrium, lattice models are fundamental in the study of criticality and nonequilibrium phase transitions (NPT). Despite its simplicity, they capture the essential features of real systems near the critical points and help us to understand the complex behavior behind traffic jams, origins of life, granular matter, social networks, and many others fields (see for instance [1,2,3]). However, a well known disadvantage concerning the usefulness of lattice models is that they are to crude to be compared directly with experiments. In fact, in order to obtain a precise phase diagram one often should employ more detailed models. This work is a new effort towards better understanding NPT. We here present a model for driven systems in which spatial coordinates vary continuously. Our aim is to provide a realistic model for Monte–Carlo types of computer simulations of anisotropic fluids. This leads us to discuss on the continuous limit of the driven lattice gas (DLG) [4,5], which is the prototype for anisotropic NPT. By continuous limit we mean an *off-lattice* analog with the same symmetries and possibly criticality, which sheds new light on its nature. Our proposed model consists of a driven version of the well–known two-dimensional Lennard-Jones fluid [6] with the particles hopping preferentially along one direction. This is induced by an external drive, ε, *e.g.*, an applied electric field assuming the particles are positive ions. In this work, we report results for a Monte Carlo study in the 'canonical' ensemble with the transitions rates defined bia a biased Metropolis rule, focusing on its structural quantities and its phase diagram including a detailed study of the coexistence curve.

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Cascade dynamics of multiplex propagation

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Recent studies of cascades in physical, biological, and social networks have shown that reducing network order by randomly rewiring ties in a regular lattice significantly increases the rate of propagation. For simple propagation (such as the spread of information, disease, or rumor, in which a single activated node is sufficient to trigger the activation of its neighbors), bridge ties connecting otherwise distant nodes achieve dramatic gains in efficiency by creating "shortcuts" across the graph. We show that this result is not robust as the thresholds of activation increase. For multiplex propagation, in which node activation requires simultaneous exposure to multiple activated neighbors, bridge ties to distant nodes reduce propagation rates as the average threshold is increased. Moreover, too many bridge ties can prevent cascades from occurring altogether.

Geographical scale-free triangulation

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In contrast to abstract graphs, many real networks are embedded in a metric space. On the other hand, the scale-free (SF) structure that follows a power law degree distribution has been commonly found in biological, technological, and social networks. Recently, geographical SF networks have been studied [1][2][3], the planar embedding is practically important. This paper proposes a modified model without crossing links by the geographical preferential linkings and Delaunay triangulation (DT) to reduce long-range links. The DT generates the optimal planar graph in some criteria [4] by diagonal flipping.

Let us consider a random Apollonian network (RA) [3] generated by geographical linking based on the division of a service area (triangle region). Note that the probability of connection