

**P78 Bouchaud-Mezard model on random networks***T. Ichinomiya*

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We studied the Bouchaud-Mezard (BM) model, which is one of the simplest model to explain Pareto law in a real economy, on a random network. Using "adiabatic and independent" assumptions, we analytically obtained the stationary probability distribution function of wealth. The results show that wealth-condensation, indicated by the divergence of the variance of wealth, occurs at a larger values of  $J$  than that obtained by the mean-field theory, where  $J$  represents the strength of exchange between agents. We compared our results with numerical simulation results and found good agreement.

**P79 Enhancement and suppression of pulse propagation in a discrete FitzHugh-Nagumo model subjected to a high-frequency stimulation***I. Ratas and K. Pyragas*

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We investigate pulse propagation through a one-dimensional myelinated axon under the action of a homogeneous high-frequency stimulation (HFS) current. The myelinated axon is modeled by a one-dimensional chain of diffusively coupled excitable elements described by the FitzHugh-Nagumo (FN) equations. Using a two-scale expansion method, we separate the fast and slow motions of the system and reduce the original problem to the solution of autonomous equations for the slow motion. By adopting asymptotic methods developed for the free FN system, we obtain various characteristics of the traveling pulse in the dependence of the HFS amplitude. We show that the critical coupling strength, below which the pulse fails to propagate, has a non-monotonous dependence on the amplitude of HFS. This opens the possibility for HFS of a moderate amplitude to enhance the pulse propagation in the domain of small coupling strengths, where the axon without stimulation demonstrates propagation failure. HFS of sufficiently large amplitude always suppresses pulse propagation. The theoretical results are confirmed by numerical experiments with the original equations. Additionally, it is shown that the effect of enhancement of pulse propagation is more sensitive to noise than the effect of suppression of pulse propagation.

**P80 New regimes of nonlinear dynamics at a time scale less than a round-trip time in a picosecond laser controlled with a combination of positive and negative optoelectronic feedbacks***M. V. Gorbunkov, Yu. Ya. Maslova, Yu. V. Shabalin, and A. V. Vinogradov*

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Laser systems controlled by a combination of two feedbacks proved to have a wider stability region and shorter build-up time than systems with a single negative feedback [1]. Control by a combination of two feedbacks allows to generate microgroupes of picosecond pulses with continuously varied periods from 25 to 75 laser-cavity round-trip times  $T_r = 10$  ns and discretely varied period up to  $100T_r$  for the purpose of a pulsed Laser-Electron X-Ray Generator [2]. The principle of memory erasing allows a simple laser system controlled by an optimally adjusted combination of inertial negative and positive feedbacks to exhibit nonlinear dynamics on the time-scale of the laser-cavity round-trip time [3]. Now we show that a combination of positive and negative inertial feedbacks allows to overcome the fundamental limitation of laser dynamics. We demonstrate, for the first time to our knowledge, regular nonlinear dynamics at times less than a laser-cavity round-trip time. The required conditions are: a) the inertial negative feedback delay  $(1 - 1/n)T_r$  optimal for a self mode-locking regime with generation of  $n \gg 1$  pulses per  $T_r$ ; b) the memory-erasing positive feedback with relative delay less than  $T_r$  and