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Universal patterns in the behavior of complex systems: from relaxation in fractal networks to distribution of income VALERICA RAICU, MICHAEL STONEMAN, RUSSELL FUNG, University of Wisconsin-Milwaukee — The study of relaxation is an active area of research in the fields of dielectric, mechanical and optical spectroscopy, which is insufficiently developed for the case of complex systems. It has been established that the relaxation of many systems deviates markedly from classical Debye dispersion function (in the frequency domain) or from pure exponential decay (in the time domain), but the exact ways in which these deviations occur and their significance are still debated issues. Here we propose that a fractal-tree network appropriately describes the relaxation pathway in a variety of complex systems and predicts coupled (or hierarchical) as well as uncoupled (parallel) relaxation processes. This approach has been originally introduced for description of dielectric relaxation in Cantorian trees in biology. Upon adequate generalization this approach sheds new light on a variety of processes, ranging from kinetics of protein-ligand rebinding through distribution of income in populations of humans.

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