Abstract for GR-TR Conference on Statistical Mechanics and Dynamical Systems

Topic: Dynamical Systems Preference: Poster

Analysis of return distributions in the coherent noise model

Ahmet Celikoglu[1*], Ugur Tirnakli[1], Sílvio M. Duarte Queirós[2]

[1] Ege University Faculty of Science Department of Physics 35100 Bornova-Izmir, Turkey

[2] Centro de Física do Porto, Rua do Campo Alegre 687, 4169-007 Porto, Portugal

[*] Electronic Address: ahmet.celikoglu@ege.edu.tr

The return distributions of the coherent noise model are studied for the system size independent case. It is shown that, in this case, these distributions are in the shape of q-Gaussians, which are the standard distributions obtained in nonextensive statistical mechanics. Moreover, an exact relation connecting the exponent τ of avalanche size distribution and the q value of appropriate q-Gaussian has been obtained as $q = (\tau + 2)/\tau$. Making use of this relation one can easily determine the q parameter values of the appropriate q-Gaussians *a priori* from one of the well-known exponents of the system. Since the coherent noise model has the advantage of producing different τ values by varying a model parameter σ, clear numerical evidences on the validity of the proposed relation have been achieved for different cases. Finally, the effect of the system size has also been analyzed and an analytical expression has been proposed, which is corroborated by the numerical results.