

Signature of nonextensive statistical mechanics in asymptotically scale-free random networks

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Wide classes of preferential-attachment-based random d -dimensional growing networks exhibit a q -exponential degree or energy (ε_i) distribution. The corresponding asymptotic power-law behavior is determined by the ratio α_A/d where α_A characterizes the distance-dependence in a preferential-attachment rule $\Pi_{ij} \propto \varepsilon_i/d_{ij}^{\alpha_A}$ ($\alpha_A \geq 0$). In order to cover more complex and realistic phenomena, we consider here a more general form, namely $\Pi_{ij} \propto \varepsilon_i / \left[d_{ij}^{\alpha_A + c}, d_{ij}^{\alpha_A'} \right]$ ($\alpha_A' > \alpha_A$; $c \geq 0$). An interesting crossover is then observed and studied in the power-law behavior of the energy distribution.