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# Universal Characteristics of Fractal Fluctuations in Prime Number Distribution

A.M.Selvam
amselvam@gmail.com

The frequency of occurrence of prime numbers at unit number spacing intervals exhibits selfsimilar fractal fluctuations concomitant with inverse power law form for power spectrum generic to dynamical systems in nature such as fluid flows, stock market fluctuations, population dynamics, etc. The physics of long-range correlations exhibited by fractals is not yet identified. A recently developed general systems theory visualises the eddy continuum underlying fractals to result from the growth of large eddies as the integrated mean of enclosed small scale eddies, thereby generating a hierarchy of eddy circulations, or an inter-connected network with associated long-range correlations. The model predictions are as follows: (i) The probability distribution and power spectrum of fractals follow the same inverse power law which is a function of the golden mean. The predicted inverse power law distribution is very close to the statistical normal distribution for fluctuations within two standard deviations from the mean of the distribution. (ii) Fractals signify quantumlike chaos since variance spectrum represents probability density distribution, a characteristic of quantum systems such as electron or photon. (ii) Fractal fluctuations of frequency distribution of prime numbers signify spontaneous organisation of underlying continuum number field into the ordered pattern of the quasiperiodic Penrose tiling pattern. The model predictions are in agreement with the probability distributions and power spectra for different sets of frequency of occurrence of prime numbers at unit number interval for successive 1000 numbers. Prime numbers in the first 10 million numbers were used for the study.