

Anomalous diffusion models as tools to real data description

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The classical financial models are based on the standard Brownian diffusion-type processes. However, in the exhibition of some real market data (like interest or exchange rates) we observe characteristic periods of constant values. Moreover, in the case of financial data, the assumption of normality is often unsatisfied. In such cases the popular Vasicek model, that is a mathematical system describing the evolution of interest rates based on the OrnsteinUhlenbeck process, seems not to be applicable. Therefore, we propose an alternative approach based on a combination of the popular OrnsteinUhlenbeck process with a stable distribution and subdiffusion systems that demonstrate such characteristic behavior. The probability density function of the proposed process can be described by a Fokker-Planck type equation and therefore it can be examined as an extension of the basic OrnsteinUhlenbeck model. In this paper, we propose the parameters estimation method and calibrate the subordinated Vasicek model to the interest rate data.