Dynamical Stochastic Processes of Returns in Financial Markets
KYUNGSIK KIM, Department of Physics, Pukyong National University, Pusan 608-737, Korea, SOO YONG KIM, Department of Physics, Korea Advanced Institute of Science and Technology, Daejeon 305-701, Korea, GYUCHANG LIM, Department of Physics, Korea Advanced Institute of Science and Technology, Daejeon 305-701, Korea, JUNYUAN ZHOU, Department of Physics, Korea Advanced Institute of Science and Technology, Daejeon 305-701, Korea, SEUNG-MIN YOON, Division of Economics, Pukyong National University, Pusan 608-737, Korea — We show how the evolution of probability distribution functions of the returns from the tick data of the Korean treasury bond futures (KTB) and the S&P 500 stock index can be described by means of the Fokker-Planck equation. We derive the Fokker-Planck equation from the estimated Kramers-Moyal coefficients estimated directly from the empirical data. By analyzing the statistics of the returns, we present the quantitative deterministic and random influences on both financial time series, for which we can give a simple physical interpretation. Finally, we remark that the diffusion coefficient should be significantly considered to make a portfolio.

Kyungsik Kim
Department of Physics, Pukyong National University, Pusan 608-737, Korea