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The non-stationary state solution of nonlinear drift Fokker-Planck equation with non-Gaussian noise and its application. (Chinese. English summary) [Zbl 1463.35478]

Summary: Non-Gaussian noise widely exists in many kinds of nonlinear systems. The study about the non-stationary state evolution behavior of the system driven by non-Gaussian noise can help us to understand its inherent evolution mechanism more deeply. In this paper, we investigate the non-stationary state evolution problem of the nonlinear dynamical system driven by both non-Gaussian noise and Gaussian white noise. First, the nonlinear dynamical system is linearized in the initial area by using the \( \Omega \)-expansion of the Green function. Then, we obtain the expression for the approximate non-stationary state solution through the eigenvalue and eigenvector theory. Finally, taking the Logistic model as an example, we examine the influences of the non-Gaussian noise intensity, the correlation time and the deviation parameter on the non-stationary state solution and its mean. The results show that when the Logistic model is used to describe the growth of product output, the non-stationary state solution can better reflect the evolution behavior of the product output near the unstable point.

MSC:
35Q84 Fokker-Planck equations
93C10 Nonlinear systems in control theory
93E03 Stochastic systems in control theory (general)

Keywords:
non-Gaussian noise; Fokker-Planck equation; non-stationary state solution; Logistic model

Full Text: DOI