NONLINEAR TIME SERIES ANALYSIS OF THE FLUCTUATIONS OF TOTAL ELECTRON CONTENT OF THE IONOSPHERE

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ABSTRACT

In recent years, the concept of chaos and nonlinear dynamics has found application in studying the behaviour of various complex systems. The earth's ionosphere is such a complex dynamic system which responds in an unpredictable way to electromagnetic drifts, solar wind energy inputs etc and the measured ionospheric parameters behave irregularly. One of the most important parameters among them is Total Electron Content (TEC). A detailed nonlinear time series analysis of the fluctuations of TEC measured at Goose Bay (470 N; 2860 E; mag.dip. 58.60 N) during the year 1985 has been carried out to investigate its dynamical behaviour. The analysis based on the calculation of the invariant characteristics such as Lyapunov exponent, correlation dimension etc and of the surrogate data test established the existence of a low dimensional deterministic chaotic system.