ATTRACTOR'S DIMENSIONS IN TWO DIMENSIONAL ECOLOGICAL MODEL

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Abstract

Hone, Irle and Thurura[9] discussed some of the beautiful aspects of dynamical behavior of the discrete two dimensional model $N_{t+1} = r\,N_t e^{-bP_t}$, $P_{t+1} = N_t\left(1 - e^{-aP_t}\right)$ but they have concluded that the model is unrealistic in the sense that the solutions can grow unboundedly with t, however they have suggested a more realistic model as $x_{n+1} = x_n e^{r\left(1-\frac{x_n}{k}\right)-by_n}$, $y_{n+1} = x_n\left(1 - e^{-ay_n}\right)$, where a, b, c, k, r are adjustable parameters. In this paper, we try to measure the chaotic behavior of the above said model proposed by Hone et.al. The chaotic behavior is measured by various means at the accumulation point. First, the lyapunov exponent is found to be positive at the accumulation point stating that chaos has started, secondly various fractal dimensions viz Box-counting dimension, Information dimension, Correlation dimension are calculated with the help of Generalized Correlation dimension. All these dimensions are found to have fractional value which states that the attractor at the accumulation point is chaotic.

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