The map (5.11) is chaotic in the sense of Li-Yorke for the values of the parameter $\mu$ between 3.84 and 4 [27]. Moreover, for these values of the parameter, the interval $[0, 1]$ is invariant under the iterations of the map [79].

Let us take $\mu = 3.9$ in (5.11). One can verify that the conditions $(C1) - (C6)$ are valid for (5.10) with $\delta = 2$, $p = 1$, $\psi(\omega) = 3/2$, $M_f = 1/5$, $L_f = 2/5$, $M_F = 0.975$, $\lambda_{11} \approx 1.2136$, $\lambda_{12} \approx 1.0379$, $\lambda_{13} \approx 1.3246$, $\lambda_{21} \approx 1.3841$, $\lambda_{22} \approx 1.0081$, $\lambda_{23} \approx 1.1164$, $\lambda_{31} \approx 1.1630$ $\lambda_{32} \approx 1.0744$, $\lambda_{33} \approx 1.4460$, $K_{11} = 2.8$, $K_{12} = 2$, $K_{13} = 3.2$, $K_{21} = 3.4$, $K_{22} = 1.8$, $K_{23} = 2.4$, $K_{31} = 2.6$, $K_{32} = 2.2$, $K_{33} = 3.6$, $H_0 \approx 10.7262$, $\overline{c} \approx 0.1739$, $\overline{d} \approx 0.2596$. Thus, according to Theorem 4.1, SICNN (5.10) is Li-Yorke chaotic. We take $\zeta_0 = 0.715$, and represent in Figure 1 the $x_{22}$-coordinate of (5.10) corresponding to the initial data $x_{11}(0) = 0.42$, $x_{12}(0) = 0.35$, $x_{13}(0) = 0.56$, $x_{21}(0) = 0.48$, $x_{22}(0) = 0.23$, $x_{23}(0) = 0.39$, $x_{31}(0) = 0.48$, $x_{32}(0) = 0.25$, $x_{33}(0) = 0.51$. Figure 1 supports the result of Theorem 4.1 such that the network (5.10) possesses Li-Yorke chaos.

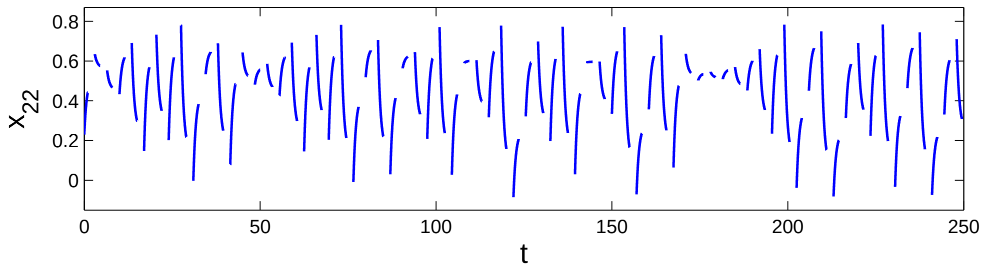


Figure 1: Time series of the $x_{22}-$coordinate of SICNN (5.10). The figure manifests that the network behaves chaotically.

In the next section, we will demonstrate how to control the chaos of SICNN (5.10) numerically by using the Pyragas control technique [48].

# 6 Control of chaos

In the literature, control of chaos is understood as the stabilization of unstable periodic orbits embedded in a chaotic attractor. The studies on the control of chaos originated with Ott, Grebogi and Yorke [80]. The Ott-Grebogi-Yorke (OGY) control method depends on the usage of small time-dependent perturbations in an accessible system parameter to stabilize an already existing periodic orbit, which is initially unstable. Another well known technique for the control of chaotic systems is the Pyragas method [48], which is known as delayed feedback control.

The source of the chaotic outputs generated by SICNN (5.10) is the logistic map (5.11). In this section, we will show that the chaos of (5.10) can be controlled by applying the Pyragas control technique to the map (5.11). More precisely, we will stabilize the unstable $7/2-$periodic solution of (5.10) by performing the Pyragas method to (5.11) around the fixed point $1 - 1/\mu$ of the map.