Yuan, Li-Guo; Nie, Du-Xian; Fu, Xin-Chu

Complex orbits in a second-order digital filter with sinusoidal response. (English)

Zbl 1198.94054


Summary: This paper analyzes a two-dimensional piecewise affine map driven by a periodic perturbation, which is relevant to the second-order digital filters with sinusoidal response. By using symbolic dynamics method, a formula for an arbitrary iterate of the map is derived. When overflow occurs, the system is nonlinear. If the corresponding symbolic sequences are aperiodic, some orbits are computed and illustrated. These show that the orbit structure is much richer than that of the autonomous and step-response cases. And numerical experiments to estimate the fractal dimension of the chaotic cases are performed with fractal Brownian motion. Finally, higher order periodic trajectories are found via the particle swarm optimization.

Editorial remark: There are doubts about a proper peer-reviewing procedure of this journal. The editor-in-chief has retired, but, according to a statement of the publisher, articles accepted under his guidance are published without additional control.

MSC:

94A12 Signal theory (characterization, reconstruction, filtering, etc.)
37N35 Dynamical systems in control

Full Text: DOI

References:

[17] Vrahatis, M., An efficient method for locating and computing periodic orbits of nonlinear mappings, J comp phys, 119,