Heterogeneous Triopoly Game with Isoelastic Demand Function

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Abstract

In this paper, we analyze a triopolistic market with heterogeneous firms when the demand function is isoelastic.We consider the same heterogeneous firms as Elabbasy et al. (Comput.Math. Appl. 57:488–499, 2009) introducing a nonlinearity in the demand function instead of the cost function. Stability conditions of the two equilibrium points and complex dynamics are studied. The main novelty consists of the double route to chaos, via period-doubling bifurcations and via Neimark–Sacker bifurcation. The two routes have important differences from the economic point of view.

Keywords: *Triopoly game, Nash equilibrium point, Heterogeneous firms, Isoelastic demand function.*

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Competition Analysis of a Triopoly Game with Bounded Rationality

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Abstract

A dynamic Cournot game characterized by three boundedly rational players is modeled by three nonlinear difference equations. The stability of the equilibria of the discrete dynamical system is analyzed. As some parameters of the model are varied, the stability of Nash equilibrium is lost and a complex chaotic behavior occurs. Numerical simulation results show that complex dynamics, such as, bifurcations and chaos are displayed when the value of speed of adjustment is high. The global

complexity analysis can help players to take some measures and avoid the collapse of the output dynamic competition game.

Keywords: *Triopoly game, Nash equilibrium,; Rational player, Chaotic.*

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Dynamical Complexities in a Discrete-time Food Chain

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Abstract

In this paper, a discrete-time food chain characterized by three species is modeled by a system of three nonlinear difference equations. The existence and local stability of the equilibrium points of the discrete dynamical system are analyzed. It is shown that for some parameter values the interior equilibrium point loses its stability through a discrete Hopf bifurcation. Basic properties of the discrete system are analyzed by means of phase portraits, bifurcation diagrams and Lyapunov exponents. We have varied the result through numerical calculation.

Keywords: *Discrete food chain; Discrete Hopf bifurcation;Strange attractor; Lyapunov exponents.*

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On a Complex Logistic Difference Equation

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Abstract

In this paper, we present the equivalent system of complex logistic equation. We study the dynamic properties (fixed points, chaos and bifurcation) of the system. Numerical results that confirm the theoretical analysis are presented.

Keywords: *Logistic equation of complex variable, Local stability, Fixed points, Chaos, Bifurcation*

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Chaos and Bifurcation of a Nonlinear Discrete Prey-predator System

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Abstract

The discrete-time Prey-predator system obtained by two dimensional map was studied in present study. The fixed points and their stability were analyzed. Bifurcation diagram has been obtained for selected range of different parameters. As some parameters varied, the model exhibited chaos as a long time behavior. Lyapunov exponents and fractal dimension of the chaotic attractor of our map were also calculated. Complex dynamics such as cycles and chaos were observed.

Keywords: *Prey-predator system ;Chaotic behavior; Lyapunov exponents; Fractal dimension.*

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