Abstract

The main goal of this thesis is to investigate the periodic character, invariant intervals, oscillation and global stability and other new results of all positive solutions of the equation

$$x_{n+1} = \frac{\alpha + \beta x_n}{A + B x_n + C x_{n-k}}, \ n = 0, 1, 2, ...$$

where the parameters α, β, A, B and C are non-negative real numbers with at least one parameter is non zero and the initial conditions $x_{-k}, x_{-k+1}, ..., x_{-1}, x_0$ are non-negative real numbers with the solution is defined and $k \in \{1, 2, 3, ...\}$.

We give a detailed description of the semi-cycles of solutions, and determine conditions under which the equilibrium points are globally asymptotically stable.

In particular, our monograph is a generalization of the rational difference equation that was investigated in [15].