Abstract

In this thesis we will investigate the dynamical behavior of the following rational difference equation

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

where the parameters α, β, γ and A, B, C and the initial conditions $x_{-k}, \ldots, x_{-1}, x_0$ are non-negative real numbers, and the denominator is nonzero.

Our concentration here, is on the global stability, the periodic character, the analysis of semi-cycles and the invariant intervals of the positive solution of the above equation.

It is worth to mention that our difference equation is the general case of the rational equation which is studied by Kulenovic and Ladas in their monograph (Dynamics of Second Order Rational Difference Equation with Open Problems and Conjectures, 2002).