

## Review Article

# Solution and Attractivity for a Rational Recursive Sequence

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This paper is concerned with the behavior of solution of the nonlinear difference equation  $x_{n+1} = ax_{n-1} + bx_n x_{n-1} / (cx_n + dx_{n-2})$ ,  $n = 0, 1, \dots$ , where the initial conditions  $x_{-2}, x_{-1}, x_0$  are arbitrary positive real numbers and  $a, b, c, d$  are positive constants. Also, we give specific form of the solution of four special cases of this equation.

## 1. Introduction

In this paper we deal with the behavior of the solution of the following difference equation:

$$x_{n+1} = ax_{n-1} + \frac{bx_n x_{n-1}}{cx_n + dx_{n-2}}, \quad n = 0, 1, \dots, \quad (1.1)$$

where the initial conditions  $x_{-2}, x_{-1}, x_0$  are arbitrary positive real numbers and  $a, b, c, d$  are positive constants. Also, we obtain the solution of some special cases of (1.1).

Let us introduce some basic definitions and some theorems that we need in the sequel.

Let  $I$  be some interval of real numbers and let

$$f : I^{k+1} \longrightarrow I, \quad (1.2)$$