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## REPRESENTATION OF SOLUTIONS OF A SECOND-ORDER SYSTEM OF DIFFERENCE EQUATIONS IN TERMS OF PADOVAN SEQUENCE

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**Abstract.** This paper deals with the solution, stability character and asymptotic behavior of a rational difference equation where the initial conditions are non zero real numbers, such that their solutions are associated to Padovan numbers. Also, we investigate the two-dimensional case of the equation being considered in this study.

Keywords. Difference equations, general solution, stability, Padovan numbers.

AMS (MOS) subject classification: Primary 39A10. Secondary 40A05.

## 1 Introduction

The study of difference equations is a very rich research field. Accordingly, we have witnessed a rapid increase in the number of papers published appertain with these types of equations. Difference equations have been applied to several mathematical models in biology, economics, genetics, population dynamics, epidemiology, and so forth. Some classical classes of solvable difference equations and systems of difference equations and methods for solving them can be found, for example, in [3, 4, 5, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20] and the related references.

In paper [20], the authors gave formulas for solutions of the equation

$$y_{n+1} = \frac{1 + y_{n-1}}{y_n y_{n-1}}$$

and prove them by using only the method of induction. However, the formulas were not justified by any theoretical explanations.