DETERMINATION OF PERIOD-3 CYCLE VIA SYLVESTER MATRIX IN THE CHAOTIC REGION OF A ONE DIMENSIONAL MAP

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ABSTRACT

In science, for a long time, it has been assumed that regularity therefore predictability has been the centre of approaches to explain the behaviours of systems. Whereas in real life, it is a well known fact that systems exhibit unexpected behaviours which lead to irregular and unpredictable outcomes. This approach, named as non-linear dynamics, produces much closer representation of real happenings. The chaos theory which is one of methods of non-linear dynamics, has recently attracted many scientist from all different fields. In this paper we analyse a situation in which the sequence $\{f^n(x)\}$ is non-periodic and might be called "chaotic". Here we have considered a one parameter map (Verhulst population model), obtained the parameter value $\boldsymbol{\lambda}$for which period-3 cycle is created in a *Tangent bifurcation*, using Sarkovskii's Theorem, Sylvester's Matrix and Resultant. We also calculated the parameter range $\boldsymbol{\lambda}_0<\boldsymbol{\lambda}<\boldsymbol{\lambda}_1$ for which the map possesses stable period-3 orbit.

KEYWORDS: Period 3 Cycle, Tangent Bifurcation, Sarkovskii's Theorem, Sylvester's Matrix, Resultant, Bifurcation Diagram, Chaos