Numerical Range and Bifurcation Points of a Family of Rational Function

Abstract

Using the Numerical Range Theory we make some interesting observations about the behavior of the dynamics of the family of rational function $f_\lambda(x)$ given by

$$f_\lambda(x) = 1 - \frac{2\lambda}{x^2 + \lambda - 4}$$

in the neighborhood of the bifurcation point.
1 Introduction

The goal of this work is to propose an alternative new study for the family of real rational maps

\[ f_\lambda(x) = 1 - \frac{2\lambda}{x^2 + \lambda - 4} \quad (1) \]

applying the Numerical Range Theory to the dynamics of the map \( f_\lambda \) through iteration.

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