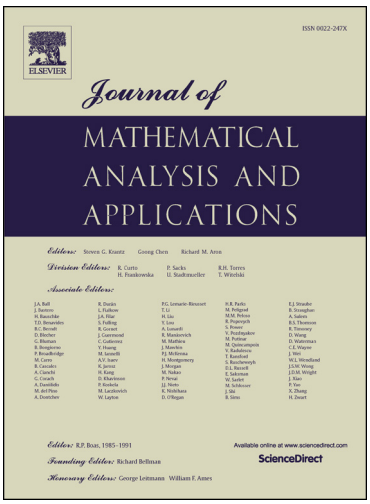
Accepted Manuscript



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PII: S0022-247X(18)30327-5
DOI: https://doi.org/10.1016/j.jmaa.2018.04.029
Reference: YJMAA 22183

To appear in: *Journal of Mathematical Analysis and Applications*

Received date: 6 October 2017

Please cite this article in press as: L. Bialas-Ciez et al., On Lagrange polynomials and the rate of approximation of planar sets by polynomial Julia sets, *J. Math. Anal. Appl.* (2018), https://doi.org/10.1016/j.jmaa.2018.04.029

On Lagrange polynomials and the rate of approximation of planar sets by polynomial Julia sets

To the memory of Professor Józef Siciak

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Abstract

We revisit the approximation of nonempty compact planar sets by filled-in Julia sets of polynomials developed in [28] and analyze the rate of approximation. We use slightly modified fundamental Lagrange interpolation polynomials and show that taking certain classes of nodes with subexponential growth of Lebesgue constants improves the approximation rate. To this end we investigate properties of some arrays of points in $\mathbb{C}$. In particular we prove subexponential growth of Lebesgue constants for pseudo Leja sequences with bounded Edrei growth on finite unions of quasiconformal arcs. Finally, for some classes of sets we estimate more precisely the rate of approximation by filled-in Julia sets in Hausdorff and Klimek metrics.

Keywords: Lagrange polynomials, Lebesgue constants, Green function, Julia sets
2010 MSC: Primary 30E10, Secondary 30C10, 30C85, 31A15, 37F10

1. Introduction

Julia sets of complex polynomials have been studied in many aspects (for an introduction to the topic, see e.g. [12]). Recently an interest arose in approximation of planar sets by polynomial Julia sets in the Hausdorff metric. One possible approach to this problem can be found in [22, Theorem 3], where the approximating sets are composite Julia sets, defined by means of families of quadratic polynomials. Another line of research was initiated

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Preprint submitted to J. Math. Anal. Appl. *April 12, 2018*