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

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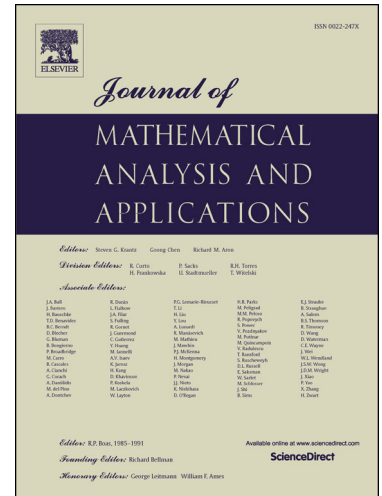
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1 On Lagrange polynomials
2 and the rate of approximation
3 of planar sets by polynomial Julia sets

4 To the memory of Professor Józef Siciak

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9 **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.

10 *Keywords:* Lagrange polynomials, Lebesgue constants, Green function,
11 Julia sets

12 *2010 MSC:* Primary 30E10, Secondary 30C10, 30C85, 31A15, 37F10

13 **1. Introduction**

14 Julia sets of complex polynomials have been studied in many aspects
15 (for an introduction to the topic, see e.g. [12]). Recently an interest arose
16 in approximation of planar sets by polynomial Julia sets in the Hausdorff
17 metric. One possible approach to this problem can be found in [22, Theorem
18 3], where the approximating sets are composite Julia sets, defined by means
19 of families of quadratic polynomials. Another line of research was initiated

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