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Approximation of the Riemann function by extremal polynomials. (Russian) Zbl 0732.30032

Special questions of function theory, 4, Baku, 101-122 (1989).

[For the entire collection see Zbl 0702.00015.]

Given a fixed point z_0 of a bounded simply connected domain G, let ϕ be the conformal mapping of G onto the disk $|w| < r_0$ with $\phi(z_0) = 0$, $\phi'(z_0) = 1$. For each $p > 0$ put $\pi_{n,p}(z) := \int_{z_0}^{z} P_{n-1}(\zeta)d\zeta$, where P_{n-1} is a polynomial of degree $\leq n-1$, minimizing the expression $\int_G |[\phi'(z)]^{2/p} - Q_{n-1}(z)|^p d\sigma(z)$ for all polynomials Q_{n-1} of degree $\leq n-1$ with $Q_{n-1}(z_0) = 1$.

Main result: If G is a quasidisk then

$$\sup_{z\in G} \left| \int_{z_0}^{z} [\phi'(\zeta)]^{2/p} d\zeta - \pi_{n,p}(z) \right| \leq cn^{-\gamma}, \quad n \geq 1, \quad p \geq 2,$$

where $\gamma = \gamma(G,p)$, $c = c(G,p)$ are constants independent of n. If $p = 2$ the result is due to *V. I. Belyĭ* [Mat. Sbornik, n. Ser. 102(144), 331-361 (1977; Zbl 0358.30005)].

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MSC:

30E10 Approximation in the complex plane
41A10 Approximation by polynomials

Keywords:

Bieberbach polynomials

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