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«Algebraic and geometric methods
of analysis»

Book of abstracts



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LIST OF TOPICS

- Algebraic methods in geometry
- Differential geometry in the large
- Geometry and topology of differentiable manifolds
- General and algebraic topology
- Dynamical systems and their applications
- Geometric problems in mathematical analysis
- Geometric and topological methods in natural sciences
- History and methodology of teaching in mathematics

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НТБ ОНАФТ

On the problem of product of inner radii symmetric non-overlapping domains

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Let \mathbb{N} , \mathbb{R} be the sets of natural and real numbers, respectively, \mathbb{C} be the complex plane, $\overline{\mathbb{C}} = \mathbb{C} \cup \{\infty\}$ be its one-point compactification. Let $r(D, a)$ be the inner radius of the domain $D \subset \overline{\mathbb{C}}$ with respect to a point $a \in D$. The inner radius is a generalization of the conformal radius for multiply connected domains. The inner radius of the domain D is associated with the generalized Green function $g_D(z, a)$ of the domain D by the relations

$$g_D(z, a) = \ln \frac{1}{|z - a|} + \ln r(D, a) + o(1), \quad z \rightarrow a,$$

$$g_D(z, \infty) = \ln |z| + \ln r(D, \infty) + o(1), \quad z \rightarrow \infty.$$

The system of non-overlapping domains is called a finite set of arbitrary domains $\{D_k\}_{k=0}^n$, $n \in \mathbb{N}$, $n \geq 2$ such that $D_k \subset \overline{\mathbb{C}}$, $D_k \cap D_m = \emptyset$, $k \neq m$, $k, m = \overline{0, n}$.

Denote by $\alpha_k := \frac{1}{\pi} \arg \frac{a_{k+1}}{a_k}$, $\alpha_{n+1} := \alpha_1$, $k = \overline{1, n}$, $\sum_{k=1}^n \alpha_k = 2$.

Theorem 1. *For any $\gamma > 1$ there exists $n_0(\gamma) \in \mathbb{N}$, such that for any $n \geq n_0(\gamma)$, and system of points $A_n = \{a_k\}_{k=1}^n$, $|a_k| = 1$, and system of pairwise non-overlapping domains $\{D_k\}_{k=0}^n$, $0 \in D_0$, $a_k \in D_k \subset \overline{\mathbb{C}}$, such that domains $\{D_k\}_{k=1}^n$ are symmetric with respect to a unit circle, the following inequality holds*

$$r^\gamma(D_0, 0) \prod_{k=1}^n r(D_k, a_k) \leq r^\gamma(D_0^{(0)}, 0) \prod_{k=1}^n r(D_k^{(0)}, a_k^{(0)}).$$

The equality is attained if $a_k = a_k^{(0)}$ and $D_k = D_k^{(0)}$, $k = \overline{0, n}$, $a_0 = 0$, where $a_k^{(0)}$ and $D_k^{(0)}$ are, respectively, poles and circular domains of the quadratic differential

$$Q(w)dw^2 = -\frac{\gamma w^{2n} + 2(n^2 - \gamma)w^n + \gamma}{w^2(w^n - 1)^2} dw^2.$$

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