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Algebraic and Geometric Methods of Analysis

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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

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ІНТЕРНАЦІОНАЛЬНИЙ ЦЕНТР СПІВРОБІТНИЦТВА

On boundary behavior by prime ends of solutions to Beltrami equations

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It is shown that each **homeomorphic** $W_{\text{loc}}^{1,1}$ solution to the Beltrami equation is the so-called lower Q -homeomorphism with $Q(z) = K_\mu(z)$ where $K_\mu(z)$ is the dilatation quotient of this equation. It is developed on this basis, see e.g. [2], the theory of the boundary behavior of such solutions.

Let D be a domain in the complex plane \mathbb{C} and let $\mu : D \rightarrow \mathbb{C}$ be a measurable function with $|\mu(z)| < 1$ a.e. in D . The **Beltrami equation** is the equation of the form

$$f_{\bar{z}} = \mu(z)f_z \quad (1)$$

where $f_{\bar{z}} = \bar{\partial}f = (f_x + if_y)/2$, $f_z = \partial f = (f_x - if_y)/2$, $z = x + iy$, and f_x and f_y are partial derivatives of f in x and y , correspondingly. The function μ is called the **complex coefficient** and

$$K_\mu(z) = \frac{1 + |\mu(z)|}{1 - |\mu(z)|} \quad (2)$$

the **dilatation quotient** for the equation (1) that is **degenerate** if $\text{ess sup } K_\mu(z) = \infty$.

In [2] and [3], we follow Caratheodory in the definition of the **prime ends** for bounded finitely connected domains in \mathbb{C} and refer readers to Chapter 9 in [1]. In what follows, \bar{D}_P denotes the completion of the domain D by its prime ends with the **topology of prime ends**, see Section 9.5 in [1]. Further, we assume that K_μ is extended by 0 outside of D .

Theorem 1. *Let D and D' be bounded finitely connected domains in \mathbb{C} and let $f : D \rightarrow D'$ be a homeomorphic $W_{\text{loc}}^{1,1}$ solution of the Beltrami equation (1) with*

$$\int_0^{\delta(z_0)} \frac{dr}{\|K_\mu\|(z_0, r)} = \infty \quad \forall z_0 \in \partial D \quad (3)$$

where $0 < \delta(z_0) < d(z_0) = \sup_{z \in D} |z - z_0|$ and $\|K_\mu\|(z_0, r) := \int_{|z-z_0|=r} K_\mu(z) |dz|$. Then f can be extended to a homeomorphism of \bar{D}_P onto \bar{D}'_P .

REFERENCES

- [1] E.F. Collingwood, A.J. Lohwater. *The Theory of Cluster Sets*, volume 56 of *Cambridge Tracts in Math. and Math. Physics*. Cambridge: Cambridge Univ. Press, 1966.
- [2] D. Kovtonyuk, I. Petkov, V. Ryazanov. Prime ends in theory of mappings with finite distortion in the plane. *Filomat*, volume 31 (5) : 1349–1366, 2017.
- [3] I.V. Petkov. The boundary behavior of homeomorphisms of the class $W_{\text{loc}}^{1,1}$ on a plane by prime ends. *Dopov. Nac. akad. nauk Ukr.*, 6 : 19–23, 2015 [in Russian]. <https://doi.org/10.15407/dopovidi2015.06.019>

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