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Abstracts

2010 MSC. 30L10

E. S. Afanas'eva, V. V. Bilet. **Some properties of quasisymmetries in metric spaces** // Ukrainian Mathematical Bulletin, **16** (2019), No. 1, 1–17.

Let (X, d, μ) and (Y, d', μ') be metric spaces α-regular by Ahlfors with $\alpha > 0$ and locally finite Borel measures μ and μ', respectively. We consider the class ACS_E of absolutely continuous functions on a.a. compact subsets $E \subset X$ and establish the membership of mappings $f : X \to Y$ to a given class.

References. 19

2000 MSC. 30C65, 57Q60, 20F55, 32T99, 30F40, 32H30, 57M30

B. N. Apanasov. **Hyperbolic topology and bounded locally homeomorphic quasiregular mappings in 3-space** // Ukrainian Mathematical Bulletin, **16** (2019), No. 1, 10–27.

We use our new type of bounded locally homeomorphic quasiregular mappings in the unit 3-ball to address long standing problems for such mappings, including the Vuorinen injectivity problem. The construction of such mappings comes from our construction of non-trivial compact 4-dimensional cobordisms M with symmetric boundary components and whose interiors have complete 4-dimensional real hyperbolic structures. Such bounded locally homeomorphic quasiregular mappings are defined in the unit 3-ball $B^3 \subset \mathbb{R}^3$ as mappings equivariant with the standard conformal action of uniform hyperbolic lattices $\Gamma \subset \mathrm{Isom}\, H^3$ in the unit 3-ball and with its discrete representation $G = \rho(\Gamma) \subset \mathrm{Isom}\, H^4$. Here, G is the fundamental group of our non-trivial hyperbolic 4-cobordism $M = (H^4 \cup \Omega(G))/G$, and the kernel of the homomorphism $\rho\colon \Gamma \to G$ is a free group F_3 on three generators.

References. 26

2010 MSC. 35B40, 35B45, 35J62, 35K59

K. O. Buryachenko. **Local sub-estimates of solutions to double phase parabolic equations via nonlinear parabolic potentials** // Ukrainian Mathematical Bulletin, **16** (2019), No. 1, 28–45.

For parabolic equations with nonstandard growth conditions, we prove local boundedness of weak solutions in terms of nonlinear parabolic potentials of the right-hand side of the equation.

References. 23

2010 MSC. 30C75

I. Denega. **Estimates of the inner radii of non-overlapping domains** // Ukrainian Mathematical Bulletin, **16** (2019), No. 1, 46–56.

The paper is devoted to extremal problems of the geometric function theory of complex variable related with estimates of functionals defined on systems of non-overlapping domains. Till now, many such problems have not been solved, though some partial solutions are available. In the paper improved method is proposed for solving problems on extremal decomposition of the complex plane. The main results of the paper generalize and strengthening some known results in the theory of non-overlapping domains with free poles to the case of an arbitrary arrangement of systems of points on the complex plane.

References. 13

2010 MSC. 54E35

O. Dovgoshey, V. Bilet. **Uniqueness of spaces pretangent to metric spaces at infinity** // Ukrainian Mathematical Bulletin, **16** (2019), No. 1, 57–87.

We find the necessary and sufficient conditions under which an unbounded metric space X has, at infinity, a unique pretangent space $\Omega^X_{\infty,\tilde{r}}$ for every scaling sequence $\tilde{r}$. In particular, it is proved that $\Omega^X_{\infty,\tilde{r}}$ is unique and isometric to the closure of X for every logarithmic spiral X and every $\tilde{r}$. It is also shown that the uniqueness of pretangent spaces to subsets of a real line is closely related to the "asymptotic asymmetry" of these subsets.

References. 12

2010 MSC. 42A10, 42B99

M. V. Hembars'kyi, S. B. Hembars'ka. **Approximate characteristics of the classes $B^\Omega_{p,\theta}$ of periodic functions of one variable and many ones** // Ukrainian Mathematical Bulletin, **16** (2019), No. 1, 88–104.

We obtained the exact-by-order estimates of some approximate characteristics of classes of the Nikol'skii–Besov type of periodic functions of one variable and many ones in the space $B_{\infty,1}$ such that the norm in it is not weaker than the L_∞-norm.

References. 20

V. Gutlyanskiĭ, O. Nesmelova, V. Ryazanov. **To the theory of semi-linear equations in the plane** // Ukrainian Mathematical Bulletin, **16** (2019), No. 1, 105–140.

In two dimensions, we present a new approach to the study of the semi-linear equations of the form $\operatorname{div}[A(z)\nabla u] = f(u)$, the diffusion term of which is the divergence uniform elliptic operator with measurable matrix functions $A(z)$, whereas its reaction term $f(u)$ is a continuous non-linear function. Assuming that $f(t)/t \to 0$ as $t \to \infty$, we establish a theorem on existence of weak $C(\overline{D}) \cap W_{\mathrm{loc}}^{1,2}(D)$ solutions of the Dirichlet problem with arbitrary continuous boundary data in any bounded domains D without degenerate boundary components. As consequences, we give applications to some concrete model semi-linear equations of mathematical physics, arising from modelling processes in anisotropic and inhomogeneous media. With a view to further development of the theory of boundary value problems for the semi-linear equations, we prove a theorem on the solvability of the Dirichlet problem for the Poisson equation in Jordan domains with arbitrary boundary data that are measurable with respect to the logarithmic capacity.

References. 74

V. A. Zorich. **To the theory of quasiconformal mappings** // Ukrainian Mathematical Bulletin, **16** (2019), No. 1, 141–147.

The open questions of the theory of quasiconformal mappings that are adjacent to the field of studies of Professor Bogdan Bojarski are discussed.

References. 16