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Abstracts

2010 MSC. 30C75

A. K. Bakhtin. **Separating transformation and extremal problems on nonoverlapping simply connected domains** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 456–471.

In the paper we consider one well known problem of maximum of the functional

$$I_n(\gamma) = r^{\gamma}(B_0, 0) \prod_{k=1}^{n} r(B_k, a_k),$$

where B_0,...,B_n are pairwise disjoint domains in $\overline{\mathbb{C}}$, $a_0 = 0$, $|a_k| = 1$, $k = \overline{1, n}$ are different points of the circle, $\gamma \in (0, n]$, $r(B, a)$ is the inner radius of the domain $B \subset \overline{\mathbb{C}}$ relative to the point a. In the case of simply connected domains and $n = 2, 3, 4$ the solution of this problem for the maximum interval of values of the parameter γ is obtained.

References. 23

2000 MSC. 30C75

I. V. Denega, B. A. Klischuk **To the problem of extremal partition of the complex plane** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 472–480.

In this paper we consider one classic problem of geometric function theory of a complex variable on maximum of the functional

$$[r(B_0, 0)\, r(B_\infty, \infty)]^{\gamma} \prod_{k=1}^{n} r(B_k, a_k),$$

where $n \in \mathbb{N}$, $n \geqslant 2$, $\gamma \in \mathbb{R}^+$, $A_n = \{a_k\}_{k=1}^n$ is a system of points such that $|a_k| = 1$, $a_0 = 0$, B_0, B_∞, $\{B_k\}_{k=1}^n$ is a system of pairwise non-overlapping domains, $a_k \in B_k \subset \overline{\mathbb{C}}$, $k = \overline{0, n}$, $\infty \in B_\infty \subset \overline{\mathbb{C}}$, $r(B, a)$ is the inner radius of the domain $B \subset \overline{\mathbb{C}}$ with respect to the point $a \in B$. In this paper we consider the problem under some weaker restrictions on non-overlapping domains.

References. 12

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2010 MSC. 35K59, 35B44, 35K58, 35K65

Ye. A. Yevgenieva. **Limiting profile of solutions of quasilinear parabolic equations with flat peaking** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 481–495.

The paper deals with energy (weak) solutions $u(t,x)$ of the class of equations with the model representative

$$(|u|^{p-1}u)_t - \Delta_p(u) = 0, \quad (t,x) \in (0,T) \times \Omega,\, \Omega \in \mathbb{R}^n,\, n \geqslant 1,\, p > 0$$

with the following blow-up condition for energy:

$$\mathcal{E}(t) := \int_\Omega |u(t,x)|^{p+1}dx + \int_0^t \int_\Omega |\nabla_x u(\tau,x)|^{p+1}dxd\tau \to \infty \text{ as } t \to T,$$

where Ω is a smooth bounded domain. In the case of flat peaking, namely, under the following condition

$$\mathcal{E}(t) \leqslant F_\alpha(t) := \omega_0(T-t)^{-\alpha} \quad \forall\, t < T,\, \omega_0 > 0,\, \alpha > \frac{1}{p+1},$$

a precise estimate of solution profile has been obtained in a neighborhood of blow-up time $t = T$.

References. 13

2010 MSC. 18B40, 37L05, 22A15, 20D45, 20M15, 20B25

V. M. Gavrylkiv. **Automorphisms of semigroups of k-linked upfamilies** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 496–514.

A family $\mathcal{A}$ of non-empty subsets of a set X is called an *upfamily* if for each set $A \in \mathcal{A}$ any set $B \supset A$ belongs to $\mathcal{A}$. An upfamily $\mathcal{L}$ is called k*-linked* if $\bigcap \mathcal{F} \neq \emptyset$ for any subfamily $\mathcal{F} \subset \mathcal{L}$ of cardinality $|\mathcal{F}| \leq k$. The extension $N_k(X)$ consists of all k-linked upfamilies on X. Any associative binary operation $* : X \times X \to X$ can be extended to an associative binary operation $* : N_k(X) \times N_k(X) \to N_k(X)$. In the paper, we study automorphisms of the extensions of groups, finite monogenic semigroups and describe the automorphism groups of extensions of null semigroups, almost null semigroups, right zero semigroups and left zero semigroups.

References. 25

2010 MSC. 30A10, 30C10, 41A17

M. Imashkyzy, G. A. Abdullayev, F. G. Abdullayev. **Bernstein–Walsh type inequalities in unbounded regions with piecewise asymptotically conformal curve in the weighted Lebesgue space** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 515–531.

In this work, we obtain pointwise Bernstein–Walsh-type estimation for algebraic polynomials in the unbounded regions with piecewise asymptotically conformal boundary, having exterior and interior zero angles, in the weighted Lebesgue space.

References. 28

2010 MSC. 20A05, 20F99, 22A15, 06E15, 06E25

I. V. Protasov, K. D. Protasova. **Recent progress in subset combinatorics of groups** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 532–547.

We systematize and analyze some results obtained in Subset Combinatorics of G groups after publications the previous surveys [1–4]. The main topics: the dynamical and descriptive characterizations of subsets of a group relatively their combinatorial size, Ramsey-product subsets in connection with some general concept of recurrence in G-spaces, new ideals in the Boolean algebra $\mathcal{P}_G$ of all subsets of a group G and in the Stone-Čech compactification βG of G, the combinatorial derivation.

References. 28

2010 MSC. 30C62, 31A05, 31A20, 31A25, 31B25, 35Q15

V. I. Ryazanov. **The Cauchy–Stieltjes integrals in the theory of analytic functions** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 548–563.

We study various Stieltjes integrals as Poisson–Stieltjes, conjugate Poisson–Stieltjes, Schwartz–Stieltjes and Cauchy–Stieltjes and prove theorems on the existence of their finite angular limits a.e. in terms of the Hilbert–Stieltjes integral. These results hold for arbitrary bounded integrands that are differentiable a.e. and, in particular, for integrands of the class $\mathcal{CBV}$ (countably bounded variation).

References. 29

D. Simsek, F. G. Abdullayev. **On the recursive sequence** $x_{n+1} = \frac{x_{n-(k+1)}}{1+x_n x_{n-1} \dots x_{n-k}}$ // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 564–574.

In this paper a solution of the following difference equation was investigated

$$x_{n+1} = \frac{x_{n-(k+1)}}{1 + x_n x_{n-1} \dots x_{n-k}}, \ n = 0, 1, 2, \dots$$

where $x_{-(k+1)}, x_{-k}, \dots, x_{-1}, x_0 \in (0, \infty)$ and $k = 0, 1, 2, \dots$.

References. 13

O. Sukhorukova. **Factorization of generalized γ-generating matrices** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 575–594.

The class of γ–generating matrices and its subclasses of regular and singular γ–generating matrices were introduced by D. Z. Arov in [8], where it was shown that every γ-generating matrix admits an essentially unique regular–singular factorization. The class of generalized γ-generating matrices was introduced in [14,20]. In the present paper subclasses of singular and regular generalized γ-generating matrices are introduced and studied. As the main result of the paper a theorem of existence of regular–singular factorization for rational generalized γ-generating matrix is found.

References. 20

2010 MSC. 41A30, 41A50, 41A63

S. Ya. Yanchenko. **Order estimates of approximation characteristics of functions from the anisotropic Nikol'skii–Besov classes** // Ukrainian Mathematical Bulletin, **14** (2017), No. 4, 595–604.

We obtained exact order estimates of the deviation of functions from anisotropic Nikol'skii–Besov classes $B^{\boldsymbol{r}}_{p,\theta}(\mathbb{R}^d)$ from their sections of the Fourier integral. The error of the approximation is estimated in the metric of Lebesgue space $L_\infty(\mathbb{R}^d)$.

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