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BOOK OF ABSTRACTS

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$$\ell_{n+s,1}u := D_1^{2s-2}u|_{x_1=0} - D_1^{2s-2}u|_{x_1=1} = 0,\ s = 1,2,...,n, \tag{3}$$

$$\ell_{s,2}u := D_2^{2s-2}u|_{x_2=0} + D_2^{2s-2}u|_{x_2=1} = f_s(x_1),\ s = 1,2,...,n, \tag{4}$$

$$\ell_{n+s,2}u := D_2^{2s-1}u|_{x_2=0} + D_2^{2s-1}u|_{x_2=1} + \ell_s u = f_{n+s}(x_1),\ s = 1,2,...,n, \tag{5}$$

$$\ell_s u := \sum_{q=0}^{k_s}\sum_{r=1}^{m} b_{q,r,s} D_2^q u(x)|_{x_2=x_{2,r}},\ s = 1,2,...,n, \tag{6}$$

$$0 = x_{2,1} < x_{2,2} < ... < x_{2,k} = 1,\ a_p,\ b_{q,r,s} \in \mathbb{R},$$

$$q = 0,1,...,k_s,\ k_s < 2n,\ r = 0,1,...,m,\ s = 1,2,...,n,\ p = 0,1,...,n.$$

We construct the operator which maps the solutions of the self-adjoint boundary-value problem with mixed boundary conditions ($b_{q,r,s} = 0$) to the solutions of the investigated multipoint problem.

In the case of an elliptic equation the conditions of existence and uniqueness of the solution for the problem (1)-(6) are established.

[1] Ya.O. Baranetskij, P.I. Kalenyuk, M.I. Kopach, A.V. Solomko, *The nonlocal boundary value problem with perturbations of mixed boundary conditions for an elliptic equation with constant coefficients. 1*, Carpathian Math. Publ., **11**, (2019), 228–239.

[2] Ya.O. Baranetskij, P.I. Kalenyuk, M.I. Kopach, A.V. Solomko, *The nonlocal boundary value problem with perturbations of mixed boundary conditions for an elliptic equation with constant coefficients. 2*, Carpathian Math. Publ., **12**, (2020), 173–188.

Multidimensional analogue of Thron's theorem about twin parabolic convergence regions for continued fractions

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Branched continued fractions (BCF) is a multidimensional generalisation of continued fractions. Lately, it is intensively developed the theory of BCF of the special form with complex elements

$$b_0 + \mathop{\mathrm{D}}_{k=1}^{\infty} \sum_{i_k=1}^{i_{k-1}} \frac{a_{i(k)}}{b_{i(k)}},$$

where $i_0 = N$ is a fixed natural number.

Theorem. *Let the elements of the BCF*

$$\left(b_0 + \mathop{\mathrm{D}}_{k=1}^{\infty} \sum_{i_k=1}^{i_{k-1}} \frac{a_{i(k)}}{1}\right)^{-1} \tag{1}$$

lie in parabolic domains, that is $a_{i(k)} \in \mathcal{P}_{i(k)}$, $i(k) \in \mathcal{I}$, *where*

$$\mathcal{P}_{i(k)} = \left\{ z \in \mathbb{C} : |z| - \mathrm{Re}\left(ze^{-2i\gamma}\right) < \frac{2D_k^2}{i_{k-1}}\left(1-\varepsilon\right)\cos^2\gamma \right\},$$

$$\mathcal{I} = \{i(k) :\ i(k) = (i_1, i_2, \ldots, i_k),\ 1 \le i_p \le i_{p-1},\ 1 \le p \le k,\ i_0 = N\},$$

where $D_{2s} = (1-d)^2,\ D_{2s+1} = d^2,\ 0 < d < 1,\ s = 1, 2, \dots$; *the* ε *is an arbitrary small real number* $(0 < \varepsilon < 1)$. *Then*

1) there exist finite limits of even and odd approximants of the BCF (1)*;*

2) the BCF (1) *converges if the following series diverge*

$$\sum_{p=1}^{\infty} \left|a_{m[p+1]}\right|^{-1/2},\ m = \overline{1, N},$$

$$\sum_{p=1}^{\infty} \left|a_{i(n), m[p+1]}\right|^{-1/2},\ i(n) \in \mathcal{I}^{(m+1)},\ m = \overline{1, N-1};$$

$$\mathcal{I}^{(m+1)} = \{i(k) = (i_1, i_2, \dots, i_k)\ : m+1 \le i_k \le i_{k-1} \le \dots \le i_0;\ k \ge 1;\ i_0 = N\},$$

$m[p] = \underbrace{m, m, \dots, m}_{p};\ p = 1, 2, \dots$.

[1] W.J. Thron, *Two families of twin convergence regions forcontinued fractions*, Duke Math. J., **10**, (1943), 677–685.

Generalized Hermite polynomials in the description of fractional calculus and other applications

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Using the concepts and formalism of different families of Hermite polynomials, we here discuss how to represent the action of the operators involving fractional derivatives and we introduce a family of polynomials strictly related to the Hermite polynomials in order to compute the effect of fractional operators on a given function. Finally, we present some generalizations of polynomials belonging to the Bernoulli class. In particular, by using the generating function method and the concept and formalism of the two-variable Hermite polynomials, we introduce the generalized Bernoulli polynomials.

Two-dimensional generalized moment representations and Pad'e approximations for pseudo-twovariate functions

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Generalized moment representations are used to study the so-called pseudo-twovariate functions

$$f(z, w) = \sum_{k=0}^{\infty} \sum_{m=0}^{\infty} \widetilde{s}_{k+m} z^k w^m = \frac{z\widetilde{f}(z) - w\widetilde{f}(w)}{z - w},$$

where

$$\widetilde{f}(z) = \sum_{k=0}^{\infty} \widetilde{s}_k z^k.$$

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