NEW DOCTORAL DEGREES

IN THE DEPARTMENT OF MATHEMATICS UNIVERSITY OF OSIJEK

Dr. Dragana Jankov received her PhD in Mathematics from the Department of Mathematics of the University of Zagreb on 22 November 2011 with the dissertation entitled "Integral expressions for series of functions of hypergeometric and Bessel types" (Mentor: Prof. Tibor Poganj).

Abstract

This thesis presents some new results on integral expressions for series of functions of hypergeometric and Bessel types. Also there are derived two–sided inequalities of some hypergeometric functions, which are related with their integral representations.

In the first part of the thesis are defined some special functions, mathematical methods, and results which we use in prooving our own. Some of them are Gamma function, Gauss hypergeometric function ${}_2F_1$ and generalized hypergeometric function ${}_pF_q$. There are also Fox-Wright generalized hypergeometric function ${}_p\Psi_q$ and the Struve function $\mathbf{H}_\nu(z)$.
Bessel differential equation is also described, and that is one of the crucial mathematical tools that we use.
Mathieu $(\boldsymbol{a}, \boldsymbol{\lambda})$– and Dirichlet series are defined too, because they are useful for deriving most of integral representations. In that purpose, we also use condensed form of Euler–Maclaurin summation formula and fractional analysis, which are described in the introduction.

In the middle part of the thesis, i.e. in Chapter 3, 4 and 5 we work on integral representations of functional series with members containing Bessel functions of the first kind, which are divided into three types: Neumann series, which are discussed in Chapter 3, Kapteyn series, which are described in Chapter 4, and Schlömilch series, which are observed in Chapter 5.

In the last chapter of this thesis, we obtain a functional series of hypergeometric types. There, we also derive an integral representations of hypergeometric functions, such as extended general Hurwitz–Lerch Zeta function and extended Hurwitz–Lerch Zeta function, and also the two-sided inequalities for the mentioned functions.
At the end of this chapter, new incomplete generalized Hurwitz–Lerch Zeta functions and incomplete generalized Gamma functions are defined, and we also investigate their important properties.

Published papers

[1] Á. Baricz, **D. Jankov**, T.K. Pogány, Integral representations for Neumann-type series of Bessel functions I_ν, Y_ν and K_ν, *Proc. Amer. Math. Soc.* **140(3)** (2012), 951–960.

[2] Á. Baricz, **D. Jankov**, T. K. Pogány, Integral representation of first kind Kapteyn series, *J. Math. Phys.* **52(4)** (2011), Art. 043518, pp. 7.

[3] Á. BARICZ, **D. Jankov**, T. K. POGÁNY, On Neumann series of Bessel functions, *Integral Transforms Spec. Funct.* (2011) (to appear).

[4] **D. Jankov**, T. K. POGÁNY, R. K. SAXENA, An extended general Hurwitz–Lerch Zeta function as a Mathieu (a, λ) – series, *Appl. Math. Lett.* **24(8)** (2011), 1473–1476.

[5] **D. Jankov**, T. K. POGÁNY, E. SÜLI, On the coefficients of Neumann series of Bessel functions, *J. Math. Anal. Appl.* **380(2)** (2011), 628–631.

[6] R. K. SAXENA, T. K. POGÁNY, R. SAXENA, **D. Jankov**, On generalized Hurwitz–Lerch Zeta distributions occuring in statistical inference, *Acta Univ. Sapientiae Math.* **3(1)** (2011), 43–59.

[7] H. M. SRIVASTAVA, **D. Jankov**, T. K. POGÁNY, R. K. SAXENA, Two-sided inequalities for the extended Hurwitz–Lerch Zeta function, *Comput. Math. Appl.* **62(1)** (2011), 516–522.

[8] Á. BARICZ, **D. Jankov**, T. K. POGÁNY, Turán type inequalities for Krätzel functions, *J. Math. Anal. Appl.* (2011) (to appear).

[9] **D. Jankov**, T. K. POGÁNY, Andreev–Korkin identity, Saigo fractional integration operator and $Lip_L(\alpha)$ functions, *Journal of Mathematical Physics, Analysis and Geometry* (2011) (to appear).