Ivan Franko National University of Lviv
Lviv Mathematical Society

# International Conference
# COMPLEX ANALYSIS AND RELATED TOPICS

Lviv, September 23–28, 2013

## ABSTRACTS

Lviv–2013

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We say that function $f \in \mathcal{H}_0$ is of strongly regular growth (s. r. gr.) with respect to the function $v \in L$ if for all $\theta \in [0, 2\pi]$, perhaps, with the exception of $\theta$ belonging to a countable set, the limit

$$\lim_{r\to+\infty}{}^{*} \left(\ln f(re^{i\theta}) - N(r)\right)/v(r) = H(\theta, f)$$

exists. Here $\lim^{*}_{r\to+\infty}$ indicates that $r$ tends to infinity outside some $C_0$-set. We denote the class of functions of s. r. gr. by $\mathcal{H}_0^*(v)$.

**Theorem 1.** *Suppose that $f \in \mathcal{H}_0$ and for some numbers $p \in [1, +\infty)$, $b_0 \in \mathbb{R}$ and a function $G \in L^p[0, 2\pi]$ the conditions*

$$\left\|\frac{\ln|f(re^{i\theta})|}{v_1(r)} - b_0\right\|_p \to 0, \ \left\|\frac{\arg f(re^{i\theta})}{v(r)} - G(\theta)\right\|_p \to 0, \ r \to +\infty, \quad (1)$$

*hold. Then $f \in \mathcal{H}_0^*(v)$, $H(\theta, f) = iG(\theta)$ for almost all $\theta \in [0, 2\pi]$.*

*Conversely, if $f \in \mathcal{H}_0^*(v)$ and zeros of $f$ are located on a finite system of rays, then for arbitrary $p \in [1, +\infty)$ condition (1) holds with $G(\theta) = -iH(\theta, f)$, $b_0 = \lim_{r\to+\infty} n(r)/v(r)$.*

**Theorem 2.** *There exists a function $f \in \mathcal{H}_0^*(v)$, for which at least one of the relations (1) does not hold.*

Thus, the condition of that zeros of $f$ are distributed on a finite system of rays in Theorem 1 is essential.

## Canonical functions of gamma-admissible measures in half-plane

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For a $(\gamma, \varepsilon)$-admissible measure in the upper half-plane [1] the concept of a canonical function is introduced. This concept is a generalization of Nevanlinna's canonical product for analytic in half-plane functions of a finite order. It is shown that for a function whose growth is defined by a proximate order in the sense of Valiron, the canonical function and Nevanlinna's canonical product coincide.

1. Malyutin K. G., Kozlova I. I. Subharmonic functions of finite $(\gamma, \varepsilon)$-type in a half-plane // Mat. Stud. – 2012. – V. 38, No 2.– P. 154-161.

## Wiman's type inequality and Levy's phenomenon for random analytic functions in the unit disk

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Let $\mathcal{L}$ be the class of positive continuous functions on the interval $(0,1)$ increasing to $+\infty$ and such that $\int_{r_0}^1 h(r)dr = +\infty$, $r_0 \in (0,1)$. For a measurable set $E \subset (0,1)$ and $h \in \mathcal{L}$ the $h$-measure of $E$ is defined by $h$-meas $(E) \overset{def}{=} \int_E h(r)dr$.

Let $f$ be an analytic function in the unit disc $\mathbb{D} = \{z\colon |z| < 1\}$ of the form $f(z) = \sum_{n=0}^{+\infty} a_n z^n$, $Z = (Z_n(t))$, $t \in [0,1]$, be a complex sequence of random variables such that $Z$ is multiplicative system (MS) uniformly bounded by the number 1 ([1]) on the Steinhaus probability space, and $K(f,Z)$ be the class of random entire functions of the form $f_t(z) = f(z,t) = \sum_{n=0}^{+\infty} a_n Z_n(t) z^n$. For $r \in (0,1)$ we denote $M_f(r) = \max\{|f(z)|\colon |z| = r\}$, $\mu_f(r) = \max\{|a_n|r^n\colon n \geq 0\}$,

$$\Delta_h(r,f) = \frac{\ln M_f(r) - \ln \mu_f(r)}{2\ln h(r) + \ln\ln(h(r)\mu_f(r))}.$$

From a result proved in [2] it follows that in the case when $h(r) = (1-r)^{-1}$, for every analytic function $f$ in $\mathbb{D}$ there exists a set $E \subset (0,1)$ of finite logarithmic measure, i.e. $h$-meas$(E) < +\infty$ for the function $h(r) = (1-r)^{-1}$ such that $\varlimsup_{r \to 1-0, r \notin E} \Delta_h(r,f) \leq \frac{1}{2}$.