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МАТЕМАТИК ФИЗИКАНИНГ НОКЛАССИК ТЕНГЛАМАЛАРИ ВА УЛАРНИНГ ТАДБИҚЛАРИ

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НЕКЛАССИЧЕСКИЕ УРАВНЕНИЯ МАТЕМАТИЧЕСКОЙ ФИЗИКИ И ИХ ПРИЛОЖЕНИЯ

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PROPERTIES OF $A(z)$–HARMONIC MEASURE OF A BOUNDARY SET

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Let $A(z)$ be an antianalytic function, i.e. $\frac{\partial A}{\partial z} = 0$ in the convex domain $D \subset \mathbb{C}$; moreover, let $|A(z)| \le c < 1$ for all $z \in D$. The function $f(z)$ is said to be $A(z)$–*analytic* in the domain D if for any $z \in D$, the following equality holds:

$$\frac{\partial f}{\partial \bar{z}} = A(z)\frac{\partial f}{\partial z} \tag{1}$$

We denote by $O_A(D)$ the class of all $A(z)$–analytic functions defined in the domain D. According to, the function $\psi(\xi, z) = z - \xi + \overline{\int\limits_{\gamma(\xi,z)} \overline{A(\tau)}d\tau}$ is an $A(z)$–analytic function, where $\gamma(\xi, z)$ is a smooth curve which points of $\xi, z \in D$. The following set is an open subset of arbitrary convex domain D: $L(a, r) = \{|\psi(a, z)| < r\}$. For sufficiently small $r > 0$, this set compactly lies in D (we denote this fact by $L(a, r) \subset\subset D$) and contains the point a. This set $L(a, r)$ is called the $A(z)$–lemniscate centered at the point a.

$A(z)$–harmonic functions are described in detail in [1]. The class of $A(z)$–harmonic functions in the domain of D is denoted as $h_A(D)$. $\omega(z, M, L(a, r)) \in h_A(L(a, r))$ is defined very simply, according to the Poisson formula. If

$$\aleph_M(\zeta) = \begin{cases} -1, & \zeta \in M, \\ 0, & \zeta \in \partial L(a, r)\backslash M \end{cases}$$

is a characteristic function of the set $M \subset \partial L(a, r)$, then $A(z)$–harmonic measure

$$\omega(z, M, L(a, r)) = \frac{1}{2\pi r} \int\limits_{|\psi(a,\zeta)|=r} \frac{r^2 - |\psi(a, z)|^2}{|\psi(\zeta, z)|^2} \aleph_M(\zeta)\left|d\zeta + A(\zeta)d\bar{\zeta}\right|.$$

Note that for $A(z)$–harmonic measure $\omega(z, M, L(a, r))$ is satisfied by the following inequality: $-1 \le \omega(z, M, L(a, r)) \le 0$.

Theorem 1. *The function $\omega(z, M, L(a, r))$ either does not vanish anywhere,*

$$\omega(z, M, L(a, r)) < 0,$$

or is identically zero,

$$\omega(z, M, L(a, r)) \equiv 0.$$

$\omega(z, M, L(a, r)) \equiv 0$ if and only if the bounded set $M \subset \partial L(a, r)$ has measure zero, $mes M = 0$.

References

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