Contribution ID: **37** Type: **Oral**

Extremal decomposition problem for points on an arbitrary ellipse

Let $\mathbb{C}$ be the complex plane, $\overline{\mathbb{C}} = \mathbb{C} \bigcup \{\infty\}$ be its one point compactification. A function $g_B(z,a)$ which is continuous in $\overline{\mathbb{C}}$, harmonic in $B \backslash \{a\}$ apart from z, vanishes outside B, and in the neighborhood of a has the following asymptotic expansion $\mathrm{g}_B(z,a) = -\log|z-a| + \gamma + o(1), \quad z \to a, iscalledthe(classical)Greenfunctionofthedomain$B$with$ B. The inner radius $r(B,a)$ of the domain B with respect to a point a is the quantity e^{γ}. By using the variational method G.M. Goluzin established that for functions $f_k(z)$ which univalently map the disc $|z| < 1$ onto mutually non-overlapping domains, $k \in \{1,2,3\}$, exact estimate holds $\left|\prod\limits_{k=1}^{3} f'_k(0)\right| \leq \frac{64}{81\sqrt{3}} |(f_1(0) - f_2(0))(f_1(0) - f_3(0))(f_2(0) - f_3(0))|. Equality is attained only for functions$ w=f$_k(z)$ which conformally and univalently map the disc $|z| < 1$ onto the angles $2\pi/3$ with vertex at point $w = 0$ and bisectors of which pass through points $f_k(0)$, $|f_k(0)| = 1$. E.V. Kostyuchenko proved that the maximum value of multiplication of inner radiuses for three simply connected non-overlapping domains in the disk is attained for three equal sectors. However, this statement remains valid for multiply connected domains D_k. We have considered an extremal problem on the maximum of product of the inner radii on a system of n mutually non-overlapping multiply connected domains D_k containing the points a_k, $k = 1, ..., n$, located on an arbitrary ellipse $\frac{x^2}{d^2} + \frac{y^2}{t^2} = 1$ for which $d^2 - t^2 = 1$.

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Session Classification: MATHEMATICS

Track Classification: MATHEMATICS