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Abstracts of Short Communications and Posters

Section:

10. Partial Differential Equations

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Singular Differential Equations

1. Singular Analysis. The $x = 0$ is singular point (s. p.) of $y(x)$, $0 < x \leq \rho$, if for $x \to 0$, $y(x)$ is unbounded and nonintegrable. If $\lim(x \to 0)\, x \cdot y' = P$, then $\lim x \to 0(y(x)/lux) = P$. If for $\alpha > 0$ be $\lim(x \to 0)\, x^{1+\alpha} y'(x) = P_{1,\alpha}$, then $\lim(x \to 0)\, x^{\alpha} y(x) = P_{\alpha}$ and $P_{1,\alpha} = (-\alpha) \cdot P_{\alpha}$. There are some analogously results for $y^{(m)}(x)$ and for differentials operators.

2. A new class of n-dimensional singular integral equations (with kernels homogeneous of order (-n)).

3. The property of degeneracy. If $y_{(x)} \in \mathbb{C}[0 > 1]$ is solution of $-x' \cdot y' = f(x, y)$, $0 < x \leq 1$, where $f(x, y) \in \mathbb{C}$, $y_0 = y(0)$, then necessarily $f(0, y_0) = 0$. Analogously for: $\bar{z} \cdot \delta_{\bar{z}} w = f(z, w)\, (z = x + iy,\ 2 \cdot \delta_{\bar{z}} = \delta_x + i \cdot \delta_y$, then $f(0, w_0) = 0$, for $-|x|^2 \cdot \Delta u = f(x, u)\, (x = x_1, \ldots, x_n,\ |x|^2 = \sum x_k^2)$ and for equations with singular linears: $(r - q) \cdot \delta_z - w = f(z, w)$ and for $|(r - q)^2 \cdot \Delta w = f(z, w)$: if $w(z) \in C$ is solution, then $f(z, w)_{|z|=q} = 0$.

4. The total differential systems with s. p.

$$r^n \cdot U_x = a(x, y)\,, \quad r^n \cdot U_y' = b(x, y)\,, \quad r^2 = x^2 + y^2\,,$$

is received a representation formula

$$U(x, y) = c + q_{n-1} \cdot \varphi + P_{n-1} \cdot \ln r + \sum \bar{r}^{[(n-1)-k]} \cdot \gamma_k(r, \varphi) + V(r, \varphi)$$

from that follows a wide generalization of the residue-theorem.

5. For $-x \cdot y' = f(x, y)$, $0 < x \leq q$, is given a method for construct solution of Problem $[y]_{x=q} = y$, then the value $y(0)$ is determined and may be only zero of $f(0, y)$ or $+\infty$.