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Runge type approximation theorems for kernels of certain partial differential operators

Streszczenie

Let $H(\Omega)$ denote the space of holomorphic functions defined on a open subset Ω of the complex plane $\mathbb{C}$, i.e., the kernel of the Cauchy-Riemann operator on the space $C^\infty(\Omega)$ of smooth functions on Ω. From Runge's approximation theorem it follows that for open subsets $\Omega_1 \subset \Omega_2$ of $\mathbb{C}$ the restriction map $r\colon H(\Omega_2) \to H(\Omega_1)$, $rf := f_{|\Omega_1}$, has dense range if and only if no compact connected component of $\mathbb{C} \setminus \Omega_1$ is contained in Ω_2. In 1955, Lax and Malgrange extended independently this result to kernels of elliptic partial differential operators with constant coefficients. Some other classes of partial differential operators were considered later by several authors.

In this talk we will discuss the problem of characterization of density of the range of restriction maps between the kernels of certain partial differential operators defined on the spaces $C^\infty(\Omega)$ as well as on the spaces $\mathcal{E}(F)$ of smooth Whitney jets, where Ω and F are open and closed subsets of $\mathbb{R}^d$, respectively. This is joined work with Thomas Kalmes from Chemnitz University of Technology.