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Polynomial Approximation in Local Dirichlet Spaces

In this study, we investigate the behavior of partial Taylor sums, denoted as S_n , and Cesàro means (σ_n) within local Dirichlet spaces (\mathcal{D}_ζ) , offering a comparative analysis with the classical disc algebra setting. Within the classical disc algebra (\mathcal{A}) , the precise norm of S_n , commonly known as Lebesgue constants, remains indeterminate, displaying an asymptotic growth rate reminiscent of logarithmic behavior.

Within \mathcal{D}_ζ , we explore various norm definitions, revealing distinct operator norm values for both S_n and σ_n . Our analysis unveils that for S_n , three specific norms exhibit a growth rate approximating \sqrt{n} as n progresses. Notably, we also identify the existence of functions in \mathcal{D}_ζ for which the local sequence $\|S_n f\|_{\mathcal{D}_\zeta}$ diverges without bound. Furthermore, it is essential to emphasize that the norms associated with σ_n remain bounded within the context of \mathcal{D}_ζ , highlighting a significant departure from the classical disc algebra setting.