Harmonic and Complex Analysis: Modern and Classical

Dedicated to the memory of Lawrence Zalcman

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Zalcman's lemma *A family $\mathcal{F}$ of meromorphic functions on a region Ω is not normal in the chordal metric if and only if there exists a sequence $\{z_n\}$ converging to $z_\infty \in \Omega$, a sequence of positive numbers ρ_n converging to 0, and a sequence $\{f_n\} \subset \mathcal{F}$ such that*

$$g_n(\zeta) = f_n(z_n + \rho_n \zeta)$$

converges uniformly in the chordal metric on compact subsets of $\mathbb{C}$ to a nonconstant function g which is meromorphic in all of $\mathbb{C}$. Moreover, if $\mathcal{F}$ is not normal then $\{z_n\}$ and $\{\rho_n\}$ can be chosen so that

$$g^{\#}(\zeta) \le g^{\#}(0) = 1,$$

for all $\zeta \in \mathbb{C}$.

Lawrence Zalcman
1943 — 2022

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