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Subharmonic Functions and their Riesz Measure

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Abstract:

For subharmonic functions u in $\mathbb{R}^N$, of Riesz measure μ, the growth of the function $s \mapsto \mu(s) = \int_{|\zeta| \le s} d\mu(\zeta)$ $(s \ge 0)$ is described and compared with the growth of u. It is also shown that, if $\int_{\mathbb{R}^N} u^+(x)\,[-\varphi'(|x|^2)]\,dx < +\infty$ for some decreasing C^1 function $\varphi \ge 0$, then $\int_{\mathbb{R}^N} \frac{1}{|\zeta|^2}\,\varphi(|\zeta|^2+1)\,d\mu(\zeta) < +\infty$. Given two subharmonic functions u_1 and u_2, of Riesz measures μ_1 and μ_2, with a growth like $u_i(x) \le A + B|x|^\gamma \ \forall x \in \mathbb{R}^N$ $(i = 1, 2)$, it is proved that $\mu_1 + \mu_2$ is not necessarily the Riesz measure of any subharmonic function u with such a growth as $u(x) \le A' + B'|x|^\gamma \ \forall x \in \mathbb{R}^N$ (here $A > 0$, $A' > 0$ and $0 < B' < 2B$).

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