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Generalised Young Measures and Characterisation of Gradient Young Measures

Given a continuous function $f : \mathbb{R}^d \to \mathbb{R}$ with p-growth, we extend the framework developed by J.-J. Alibert and G. Bouchitté [*Non-uniform integrability and generalized Young Measure*, J. Convex Analysis 4 (1997) 129–148] obtaining a new way of representing accumulation points of

$$\int_\Omega f(v_i(z))\, d\mu(z),$$

where μ is a finite positive Borel measure on an open bounded set $\Omega \subset \mathbb{R}^n$, and $(v_i)_{i\in\mathbb{N}} \subset L^p(\Omega, \mu)$ is norm bounded. We call such representations *generalised Young Measures.*

With the help of the new representation, we then characterise these limits when they are generated by gradients, that is, when $v_i = Du_i$ for $u_i \in W^{1,1}(\Omega, \mathbb{R}^m)$, via a set of integral inequalities.

Keywords: Young measures, separable compactifications, functions of bounded variation, quasi-convexity.

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