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Semiconcave Functions with Power Moduli

A function f is approximately convex if

$$f(\alpha x + (1 - \alpha)y) \leq \alpha f(x) + (1 - \alpha)f(y) + R(\alpha, \|x - y\|),$$

for $x, y \in \text{dom} f$, $\alpha \in [0, 1]$ and for a respective perturbation term R . If the above inequality is assumed only for $\alpha = \frac{1}{2}$, then the function f is called Jensen approximately convex.

The relation between Jensen approximate convexity and approximate convexity has been investigated in many papers, in particular for semiconcave functions [see P. Cannarsa and C. Sinestrari, "Semiconcave Functions, Hamilton-Jacobi Equations, and Optimal Control", Birkhäuser, Boston 2004]. We improve an estimation involved in such relation in the above-mentioned book and show that our result is sharp.

Keywords: Semiconcave function, paraconvex function, Jensen convexity, modulus of semiconcavity.

MSC: 26B25; 39B82