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On the Weak* Convergence of Gâteaux Derivatives of Upper Envelopes

For convex functions on Banach space endowed with a uniformly Gâteaux differentiable norm two observations are presented: first, the Moreau envelope of a proper lower semicontinuous convex function is Gâteaux differentiable; second, if the Moreau envelopes of a sequence of lower semicontinuous convex functions $\{f_n\}_{n=1}^\infty$ create a pointwise convergent sequence, then Gâteaux derivatives of the envelopes (computed at a given point) are weakly* convergent.

Keywords: Subdifferentials, convex functions, Attouch's theorem, UG-smooth norm, Gateaux differentiability of the Moreau envelope, weak convergence of subdifferentials.

MSC: 49J52.