Differential properties of envelopes, the talk during the workshop: "Interactions between Algebra and Functional Analysis", 28.9 - 2.10.2016, Prague

Dariusz Zagrodny

August 13, 2016

Abstract

Differential and subdifferential properties of the Moreau envelope and the Klee envelope will be discussed during the talk.

In a vector space endowed with a uniformly Gâteaux differentiable norm, it will be presented that the Moreau envelope enjoys many remarkable differential properties and that its subdifferential can be completely described through a certain approximate proximal mapping. This description shows in particular that the Moreau envelope is essentially directionally smooth. New differential properties are derived for the distance function associated with a closed set.

It will be also presented that the Klee envelope with unit power plus an appropriate distance function is equal to some constant on an open convex subset as large as we need. As a consequence, the subdifferential properties of the Klee envelope can be inherited from subdifferential properties of the opposite of the distance function to the complement of the bounded convex open set.

References:

1. L. Thibault and D. Zagrodny, Subdifferential determination of essentially directionally smooth functions in Banach space, SIAM J. Optim. 20 (2010), 2300–326

2. A. Jourani, L. Thibault and D. Zagrodny, $C^{1,\omega(\cdot)}$-regularity and Lipschitz-like properties of subdifferential, Proc. London Math. Soc. (2012) 105, 189–223

3. A. Jourani, L. Thibault and D. Zagrodny, Differential properties of the Moreau envelope, J. Funct. Anal. (2014) 266, 1185–1237

4. A. Jourani, L. Thibault and D. Zagrodny, The NSLUC property and Klee envelope, Math. Ann. (2016), 365, 923–967