The strong Ekeland Variational Principle in quasi-metric spaces

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Abstract

Let (X, d) be a metric space and $f : X \to \mathbb{R}$ a bounded below function. Let z be a minimum point for f. One says that z is a strict minimum on X if it is the unique minimum point of f and a strong minimum if every minimizing sequence is convergent. A strong minimum is a strict minimum. The Ekeland Variational Principle (EkVP) asserts that if f is further lsc, then any perturbed function $g = f + rd$, where $r > 0$, has a strict minimum on X. Georgiev (1986,1988) proved the existence of a strong minimum for g, a result called by him the strong EkVP. These results were completed by Suzuki (2006,2010).

Versions of EkVP in quasi-metric spaces (i.e., such that the equality $d(x, y) = d(y, x)$ does not hold everywhere) were proved by Cobzaş (2011,2019), Romaguera and Karapinar (2015), Kassay et al (2019).

In this presentation I shall examine some possibilities to extend the strong EkVP to quasi-metric spaces.