26 października 2020 r.

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Singularities of semiconcave functions and applications to partial differential equations, control theory and geometry

Abstract: We consider an extension of the class of the concave functions (the so called semiconcave functions). First, we describe some results on the singular points (i.e. points of non differentiability) of an "abstract" semiconcave function. Then, we discuss some applications of these results to some problems in PDEs (e.g. the propagation of singularities for viscosity solutions of nonlinear first order equations of Hamilton-Jacobi type), control theory (e.g. propagation of the regularity of a value function along the optimal trajectories) and geometry (e.g. the study of the topology of the cut locus).