

# A Descent Step Algorithm Based on Generalized Gradients on Sets

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## Abstract

In this talk, we present a new descent step Algorithm based on generalized gradients on sets. For this reason we extend generalized gradients at a point  $x$  in the sense of Clarke to generalized gradients on sets and give some basic properties. These generalized gradients naturally give more information about the nonsmooth function on the neighborhood of a point  $x$  than the Clarke's generalized gradients at the point  $x$ . This makes trust region methods applicable, where the generalized gradient on sets plays a similar role as approximations of the Hessian in the smooth case.

Afterwards we formulate the descent step algorithm, which uses trust region ideas. We introduce some stability and convergence results. The algorithm is designed to find critical points in the sense of Clarke for nonsmooth functions robustly. We numerically test the algorithm on benchmark problems and compare the results with those of other algorithms. We conclude the talk by applying the algorithm to nonlinear contact problems in elasticity with friction.