# Positively alpha-Far Sets and Existence Results for Generalized Perturbed Sweeping Processes

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## Resumen

We consider the general class of positively alpha-far sets, introduced in [29], which contains strictly the class of uniformly prox-regular sets and the class of uniformly subsmooth sets. We provide some conditions to assure the uniform subsmoothness, and thus the positive alpha-farness, of the inverse images under a differentiable mapping. Then, we take advantage of the properties of this class to study the generalized perturbed sweeping process

{-(x)over dot(t) is an element of F(t, x(t))+ g(x(t))N (C(t), h(x(t))) a.e. t is an element of[T-0, T], x(T-0) = x(0) is an element of h(-1) (C(T-0)),

where g : X -> L(Y; X), h: X -> Y are two functions, X, Y are two separable Hilbert spaces and the sets C(t) belong to the class of positively alpha-far sets. This differential inclusion includes the classical perturbed sweeping process as well as complementarity dynamical systems. Our study is achieved by approximating the given differential inclusion with maximally perturbed differential inclusions which, under certain compactness conditions, converges to an absolutely continuous solution. Moreover, this approach allows us to get existence for evolution inclusions of the form

{-(x)over dot(t) is an element of partial derivative f(t, x(t)) + F(t, x(t)) a.e. t is an element of[T-0, T], x(T-0) = x(0),

where [T-0, T] is a fixed interval with 0 <= T-0 < T, f : [T-0, T] x X -> RU {+infinity} is a lower semi-continuous function, not necessarily convex. Here partial derivative f(t, .) denotes the Clarke subdifferential of the function f(t, .) and F : [T-0, T] x X paired right arrows X is a perturbation term.

## Palabras clave

**KeyWords Plus:**DIFFERENTIAL VARIATIONAL-INEQUALITIES; PROX-REGULAR SETS; HILBERT-SPACE; EVOLUTION-EQUATIONS; DYNAMICAL-SYSTEMS; INCLUSIONS

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