Mirror Sweeping Processes Driven by Bounded Variation Moving Sets

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This presentation is concerned with the study of the so called Mirror Sweeping Process, a dynamical system of the form:

$$\begin{cases} \dot{x}(t) \in -N_{C(t)}\left(\nabla\varphi(x(t))\right) + f(t,x(t)) & \text{a.e. } t \in [T_0, T], \\ x(T_0) = x_0, \end{cases}$$

where φ is a mirror map, an operator commonly used to perform the Mirror Gradient Descent method. First, we show that when the moving set is convex and Lipschitz continuous, the differential inclusion can be regularized by a family of well-posed ordinary differential equations. This family of solutions is proven to converge uniformly to a unique solution of the sweeping process. Then, we suppose the moving set is convex and of bounded retraction with respect to the excess, where we use a factorization technique to parametrize the moving set by means of the arc length, and filling in the jumps with a suitable family of geodesics.