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Variational Analysis for the Bilateral Minimal Time Function

We derive formulas for the Fréchet (singular) subdiferentials of the bilateral minimal time function $T : \mathbb{R}^n \times \mathbb{R}^n \to [0, +\infty]$ associated with a system governed by differential inclusions. As a consequence, we give a connection between the Fréchet normals to the sub-level sets of T and to its epigraph. Finally, we show that the Fréchet normal cones to the sub-level set of T at a point (α, β) and to epi(T) at $((\alpha, \beta), T(\alpha, \beta))$ have the same dimension.

Keywords: Bilateral minimal time function, Frechet subdifferential, singular subdifferential, normal cone.

MSC: 49J24, 49J52