Optimality criteria for vector nonsmooth Lyapunov-type continuous-time optimization problems

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Abstract

This work deals with multi-objective continuous-time optimization problems with inequality type of constraints. Necessary optimality conditions are obtained for convex problems that include both phase and integral constraints. Differentiability assumption is not imposed. To address non-smoothness, the study relies on subdifferential calculus.

The core methodological contribution lies in the application of a recently established theorem of the alternative for convex systems in infinite-dimensional spaces [1]. We derive Karush-Kuhn-Tucker type necessary conditions for efficient (Pareto optimal) solutions under a specific regularity condition adapted for the L_∞ functional space

The main result is refined when affine functions are separately considered from other convex non-affine functions.

Keywords: Multi-objective continuous-time problems, Isoperimetric problems, Necessary optimality conditions, Theorems of the alternative

References

1. Arutyunov, A.V., Zhukovskiy, S.E., Marinković, B: Theorems of the alternative for systems of convex inequalities., Set-Valued and Variational Analysis 27.1 (2019) 51–70.