

# A derivative-free approach to optimal control problems with piecewise constant Mayer cost function

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**Abstract:** In some optimal control problems, the state space is partitioned into several regions, each having its own Mayer cost value. A piecewise constant Mayer cost function may be used to model these problems. In such a context, the standard numerical methods used in optimal control theory naturally fail, due to the discontinuities and the null gradients associated with the Mayer cost function.

In this talk, a numerical method is proposed to solve this class of problems. This so-called hybrid method aims to separate the variables affecting the discontinuities from the others and optimize them with derivative-free optimization techniques, while the remaining are optimized via smooth optimization techniques.

Numerical simulations are performed on some standard control systems to show the efficiency of the hybrid method. In these simulations, NOMAD and IPOPT are used as, respectively, derivative-free optimization and smooth optimization solvers.

## References :

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