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Summary: In this paper, we study a linear-quadratic optimal control problem of Mayer type given by a fractional control system. First, we prove a theorem on the existence of a solution to such a problem. Next, using the local implicit function theorem, we derive a formula for the gradient of a cost functional under constraints given by a control system and prove a maximum principle in the case of a control constraint set. The formula for the gradient is used to implement the gradient methods for the problem under consideration.

MSC:
49J15 Existence theories for optimal control problems involving ordinary differential equations
49K15 Optimality conditions for problems involving ordinary differential equations
49N10 Linear-quadratic optimal control problems
49M37 Numerical methods based on nonlinear programming
34A08 Fractional ordinary differential equations
26A33 Fractional derivatives and integrals
90C30 Nonlinear programming

Keywords:
fractional Mayer problem; linear-quadratic optimal control problem; fractional Riemann-Liouville derivative; maximum principle; gradient methods

Full Text: DOI

References:
[1] L. Bourdin, D. Idczak, Fractional fundamental lemma and fractional integration by parts formula - Applications to critical points of Bolza functionals and to linear boundary value problems, submitted for publication. · Zbl 1309.26007

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