

# Feedback Minimum Principle for Optimal Control Problems with Terminal Constraints

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**Abstract.** In a series of previous papers, the author obtained nonlocal necessary optimality conditions for free-rightpoint classical and non-smooth optimal control problems. Feedback Minimum Principle is one of these optimality conditions, which is formulated completely in terms of objects from the Maximum Principle but efficiently strengthen it. In the present talk, the Feedback Minimum Principle is extended to problems with terminal constraints.

**Keywords:** Optimal control, perturbed Maximum Principle, feedback controls, terminal constraints, modified Lagrangians.

The talk is devoted to generalization of the Feedback Minimum Principle to smooth terminally-constrained problems of optimal control.

The proof of the main result is based on releasing of the constraints by techniques, which provide the property of global convergence, namely, the Lagrange multipliers with quadratic penalty, and parameterization of the cost functional. Both these techniques let us obtain certain versions of the Feedback Minimum Principle in a perturbed (relaxed) form: an optimal process of the addressed problem should be  $\varepsilon$ -optimal for a sequence of approximation problem of a sufficiently large index.

In the talk, we discuss some aspects of practical implementation of the raised approximate optimality principles, and the related theoretical issues.

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