Geometric integrators for solving optimal control problems appearing in engineering models

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Abstract

In this paper, numerical methods based on Magnus expansions are proposed to solve optimal control problems that appears in some engineering models. The application of linear quadratic methods leads to matrix Riccati differential equations that should be solved numerically. The exponential integrators provide quantitative improvements compared with other classical numerical methods, while also some important qualitative properties of the original problem are preserved.

An illustrative real example appearing in an engineering model is presented in order to shown the benefits that the proposed methods improves versus standard numerical methods.

Key words: Optimal control, linear quadratic method, matrix Riccati differential equation, second order exponential integrators.
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