

短文

## 非线性最优控制系统的保辛摄动近似求解

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摘要

非线性两端边值问题是在非线性最优控制计算中遇到的主要困难, 通常将其转化为线性两端边值问题的迭代求解. 因此, 很有必要发展求解线性时变非齐次方程的两端边值问题的精确、高效算法. 本文通过引入区段混合能的概念, 将问题转化为区段的混合能矩阵及向量的求解, 进一步给出了它们的保辛摄动算法. 该算法具有很强的并行性, 高效而精确. 本文还指出经典的 Riccati 变换方法是该方法的一个特例. 数值算例验证了本文方法的有效性.

关键词 [非线性两端边值问题](#) [非齐次Riccati变换](#) [变系数非线性矩阵Riccati方程](#) [区段混合能](#) [保辛摄动](#) [并行运算](#)

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## Computation of Nonlinear Optimal Control via Symplectic Conservative Perturbation Method

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Abstract

The nonlinear two-point boundary-value problem (TPBVP) poses the major difficulty in the computation of nonlinear optimal control systems, which is usually solved through iteration of the corresponding linearization TPBVP. Therefore, it is necessary to develop accurate and efficient algorithms for TPBVPs of linear time varying systems. By introducing the concept of interval mixed energy, the nonlinear TPBVP can be solved by converting the interval mixed energy matrices and vectors. And the classical Riccati transformation can be regarded as a special case of the interval mixed energy method. Then, an symplectic conservative and strongly parallel perturbation algorithm has been presented. Numerical results demonstrate its effectiveness.

Key words [Nonlinear two-point boundary-value problem](#) [inhomogenous Riccati transformation](#) [nonlinear matrix Riccati equation with variable coefficients](#) [interval mixed energy](#) [symplectic conservative perturbation](#) [parallel arithmetic](#)

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