

# 一类控制受约束非线性系统的基于单网络贪婪迭代DHP算法的近似最优镇定

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## 摘要

提出一种贪婪迭代DHP (Dual heuristic programming)算法, 解决了一类控制受约束非线性系统的近似最优镇定问题. 针对系统的控制约束, 首先引入一个非二次泛函把约束问题转换为无约束问题, 然后基于协状态函数提出一种贪婪迭代DHP算法以求解系统的HJB (Hamilton-Jacobi-Bellman)方程. 在算法的每个迭代步, 利用一个神经网络来近似系统的协状态函数, 而后根据协状态函数直接计算系统的最优控制策略, 从而消除了常规近似动态规划方法中的控制网络. 最后通过两个仿真例子证明了本文提出的最优控制方案的有效性和可行性.

关键词 [贪婪迭代](#) [约束](#) [非二次泛函](#) [最优控制](#) [神经网络](#)

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## Near-optimal Stabilization for a Class of Nonlinear Systems with Control Constraint Based on Single Network Greedy Iterative DHP Algorithm

Optimal State Estimation for Discrete-time Systems with Random Observation Delays

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## Abstract

The near-optimal stabilization problem for nonlinear constrained systems is solved by greedy iterative DHP (Dual heuristic programming) algorithm. Considering the control constraint of the system, a nonquadratic functional is first introduced in order to transform the constrained problem into a unconstrained problem. Then based on the costate function, the greedy iterative DHP algorithm is proposed to solve the Hamilton-Jacobi-Bellman (HJB) equation of the system. At each step of the iterative algorithm, a neural network is utilized to approximate the costate function, and then the optimal control policy of the system can be computed directly according to the costate function, which removes the action network appearing in the ordinary approximate dynamic programming (ADP) method. Finally, two examples are given to demonstrate the validity and feasibility of the proposed optimal control scheme.

Key words [Greedy iterative](#) [constraint](#) [nonquadratic functional](#) [optimal control](#) [neural network](#)

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