

分布参数最优控制的边界元共轭梯度算法

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摘要 研究了一类线性椭圆型分布参数最优控制问题的数值解算法. 得到最优控制对应的最优性方程组, 在凸性条件下, 证明了最优控制的唯一存在性问题. 将最优控制问题化为以控制函数和状态函数为局中人的递阶式 (Stackelberg) 非合作对策问题, 其平衡点是最优控制的解. 进一步得到求平衡点的边界元共轭梯度算法. 最后, 研究算法中边界元离散的误差估计, 以算例验证该算法.

关键词 [分布参数最优控制](#), [基本解](#), [边界元方法](#), [Nash平衡点](#), [共轭梯度算法](#).

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Conjugate Gradient-Boundary Element Method to Distributed Optimal Control Problem

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Abstract The numerical solution of distributed optimal control of a linear elliptic problem is investigated. The system of optimality consisting of state and costate variables (Lagrangian multiplier) for the optimal control is derived, and in convex condition, uniqueness of optimal solution is proved. The optimal control problem is translated into a kind of two players game problem which is a non-cooperative Stackelberg game between control function and state function.

The Nash equilibrium point for the new system is the solution of the optimal control problem.

The conjugate gradient-boundary element method

for solving the Nash equilibrium point is developed. Finally, the

error estimates for these schemes are obtained. Numerical results

indicate that the approach can save substantial computational work and that the algorithm is effective.

Key words [Distributed optimal control](#) [fundamental solution](#) [boundary element method](#) [Nash equilibrium point](#) [conjugate gradient method](#).

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