

## 基于状态空间模型和线性控制技术的动态带宽分配策略

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**摘 要:** 提出一种动态策略来实现网络化控制系统中的带宽分配管理.具体实现是首先得到 NCS 中每个设备的状态空间模型, 然后通过对状态空间模型参数的动态性分析, 并结合每个控制回路的带宽分配动态性状态变量, 从而得到扩展后的状态空间模型; 最后通过采用合适的自适应控制规则, 使得每个控制回路能根据其局部动态性使用带宽, 同时使整个网络的控制性能最优化.采用 ball & beam 过程的仿真结果表明, 本文提出的动态带宽分配算法相对于传统的静态带宽分配算法来说, 不但提高了带宽利用率, 而且还可以提高整个网络的控制性能.

**关键词:** 状态空间模型; 带宽分配; 控制规则; 利用率; 控制性能

## The Dynamic Bandwidth Allocation Strategy Based on State Space Model and Linear Control Technology

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**Abstract:** A dynamic strategy is proposed to realize the bandwidth allocation management in networked control systems in this paper. The concrete way is that the state space model of each device is obtained in networked control system. Then, the extended state space model is obtained by the dynamic analysis of the state space model parameters, together with the state variable with the dynamic of the bandwidth allocation for each control loop. In the end, each control loop can use the bandwidth according to its local dynamic and the control performance for the whole network is optimized by the appropriate adaptive control rule. The simulation results through the ball & beam process show that the proposed dynamic bandwidth allocation algorithm not only increase the bandwidth utilization, but also improve the control performance of the whole network with respect to the static traditionally bandwidth allocation algorithm.

**Key words:** state space model; bandwidth allocation; control rule; utilization; control performance

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