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# ABR流量控制中的变结构控制器

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Abstract
Available bit rate (ABR) flow control is an effective measure in ATM network congestion control and traffic management. In high-speed ATM networks, the switch performance lies on the algorithm simplicity in some degree. Although the simplicity of binary flow control is very attractive, the queue length and allowed cell rate (ACR) controlled by the standard EFCI algorithm oscillate with great amplitude, which must have negative impact on the performance, so its applicability is doubted, and then the explicit rate feedback mechanism, which is relatively complex but effective, is introduced and explored. In this study, based on the ABR flow control model, a novel binary ABR flow control algorithm is put forward using the approach for designing the sliding mode variable structure controller in robust control theory, jointly applying the congestion detection mechanism based on the probability. The new algorithm avoids the self-oscillation induced by the nonlinear component in the standard EFCI algorithm, which is very favorable for utilizing the simplicity of binary flow control mechanism to optimize the switch performance. The simulation results show that the sliding mode variable structure controller greatly constrains the oscillations of ACR and queue, smoothes the delay jitter, which provides the reliable implementation mechanism for QoS guarantee in ATM network.

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摘要
自适应比特(available bit rate,简称ABR)业务的流量控制是ATM网络中一种有效的拥塞控制机制和流量管理手段.在高速的ATM网络中,算法的简洁性在很大程度上决定着交换机的性能.尽管二进制ABR流量控制的简洁性具有相当大的吸引力,但标准的EFCI算法控制的队列长度和允许信元速率(allowed cell rate,简称ACR)却容易出现大幅振荡的现象,这势必会降低链路的利用率,严重影响交换机的性能.进而又有了相对复杂却有效的显式速率反馈机制.在此研究中,以已有的ABR流量控制模型为基础,应用概率拥塞判定机制,并借助鲁棒控制理论中滑模变结构控制器的设计方法,为ABR流量控制设计了一种新的二进制算法,避免了标准EFCI算法中非线性环节诱发的自激振荡,这对于充分发挥二进制流控算法的简洁性以及优化交换机的性能是极为有利的.仿真实验表明:二进制流量控制中的滑模变结构算法大幅度地抑制了ACR和队列的振荡,平滑了由此

而引入的时延抖动,为实现ATM网络中的服务质量提供了可靠的实现机制.

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