

短文

比例-积分TCP/AQM网络稳定性分析的参数空间方法

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摘要

This work focuses on deriving the necessary and sufficient stability condition of transmission control protocol (TCP) network with a proportional-integral (PI) active queue management (AQM) scheme via a parameter space approach. First, a fluid-flow TCP's nonlinear model is converted into a linear time-delay system of neutral type. Second, the stability of the closed-loop system is characterized in terms of the network's and the controller's parameters. By simulation studies we investigate the boundary's relations of these two kinds of parameters in the parameter space and illustrate how PI controller's parameters affect the stability. Finally, different stability conditions are compared to show the less conservatism of our necessary- and sufficient-condition-based method, and simulation experiments by both Matlab and NS-2 are conducted to prove our claim.

关键词 [Congestion control](#) [TCP](#) [PI control](#) [stability](#)

分类号

Stability Analysis of PI TCP/AQM Networks: A Parameter Space Approach

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Abstract

This work focuses on deriving the necessary and sufficient stability condition of transmission control protocol (TCP) network with a proportional-integral (PI) active queue management (AQM) scheme via a parameter space approach. First, a fluid-flow TCP's nonlinear model is converted into a linear time-delay system of neutral type. Second, the stability of the closed-loop system is characterized in terms of the network's and the controller's parameters. By simulation studies we investigate the boundary's relations of these two kinds of parameters in the parameter space and illustrate how PI controller's parameters affect the stability. Finally, different stability conditions are compared to show the less conservatism of our necessary- and sufficient-condition-based method, and simulation experiments by both Matlab and NS-2 are conducted to prove our claim.

Key words [Congestion control](#) [TCP](#) [PI control](#) [stability](#)

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