Stabilization of PDE-ODE cascades for conservative systems in the presence of input nonlinearities

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Résumé

In this article, we study the stabilization of boundary-controlled cascaded PDE-ODE systems with input nonlinearities. In the first case, we explore the application of integral action. In the second case, inspired by internal model methods, we examine the scenario where the added dynamics involve an oscillatory system. It's noteworthy that in both cases, the open-loop dynamics of the PDE, i.e., wave equation, is only conservative, not necessarily asymptotically stable. Inspired by recent developments in the forwarding approach, our methodology involves the use of weak Lyapunov functionals and the observability property. We establish the well-posedness and global asymptotic stability of the closed-loop system.

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