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Thesis Title : A Modification of a Training Rule for Neural Network Controller
Which Guarantees Finite-Region Stability for Nonhermitian Systems
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Abstract

This thesis presents new stability conditions of continuous-time and discrete-time neural network control systems as a modification of the original work introduced by Kuntanapreeda and Fullmer. The major modification is that the stability conditions can be applied to locally nonhermitian systems. Like the original work, the controlled systems are needed to be controllable and full-state accessible for feedback purpose. The neural network controllers are feedforward networks that have one hidden layer. Control stability is shown by the existence of a Lyapunov function, which is a by-product of the training process. Moreover, a region of stability can also be estimated by evaluating this Lyapunov function.

The proposed stability conditions have been applied to several case studies via computer simulations. All cases gave satisfactory control results. In addition, the studies indicated that a higher training effort is required in the case of sampled data problems. This is because the stability condition for discrete-time systems is more complicated than that for the continuous-time systems.



Committee Chairperson