

Perspectives of hypergeometric functions in the partial pole placement for infinite dimensional systems

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Abstract

Recently, in the context of the study of the exponential stability of the trivial solution of delay-differential equations, a new link between the degenerate hypergeometric function and the zeros distribution of the characteristic function associated with linear delay-differential equations was emphasized. Such a link allowed the characterization of a property of time-delay systems known as multiplicity-induced-dominancy, which opened a new direction in designing low-complexity controllers not only for time-delay systems but also for some classes of partial differential equations by using a partial pole placement idea. In this talk, after recalling some mathematical prerequisites, the foundation of such pole placement methodology will be presented, then the open questions will be discussed. Some applications such as the active control of vibrations occurring in flexible structures and in particular the modeling of the CNS action on the human balance will emphasize the benefits of the proposed control strategy. Lastly, a newly dedicated software called P3 δ (<https://cutt.ly/p3delta>) will be commented.