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Functional Analysis and Applications Group

Finite time stability analysis of a class of nonlinear generalized fractional systems with delayed state

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Abstract

For some engineering systems whose operation is time limited and should be done within prescribed bounds on system variables, the only meaningful stability concept is finite time stability. Since the concept of a change given in terms of the new generalized proportional fractional derivative (GPFD) is more appropriate for some specific applications, in this work we investigate two finite time stability test procedures for fractional differential systems with time delays involving the GPFD. One stability criterion depends on the time delay while the second one is delay independent. We present two different approaches. The first one is based on Hölder's and Jensen's inequalities, while the second one concerns the Bellman–Grönwall method using the recently introduced proportional generalized Grönwall inequality. Finally, we provide two numerical examples to show the practicability of the developed procedures. This talk is based on joint work with Delfim F. M. Torres.

References

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