

WEAK OBSERVABILITY OF SMALL SOLUTIONS OF DIFFERENTIAL-ALGEBRAIC SYSTEMS WITH DELAYS

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In this paper we introduce the concept of small solutions, i.e., solutions that decay more rapidly than any exponential, for linear differential-algebraic systems with delays (DAD systems). Let us consider DAD system of observation in the form:

$$\begin{aligned}\dot{x}_1(t) &= A_{11}x_1(t) + A_{12}x_2(t), \quad t > 0, \\ x_2(t) &= A_{21}x_1(t) + A_{22}x_2(t-h), \quad t \geq 0, \\ y(t) &= B_1x_1(t) + B_2x_2(t).\end{aligned}$$

System should be completed with its initial conditions of the form $x(+0) = x_0$, $y(\tau) = \psi(\tau)$, $\tau \in [-h, 0)$, $x_0 \in \mathbb{R}^{n_1}$ and $\psi \in PC([-h, 0), \mathbb{R}^{n_2})$ and $PC([-h, 0), \mathbb{R}^{n_2})$ denotes the set of piecewise continuous functions n_2 -vector-functions in $[-h, 0]$. We present effective conditions for observability of non-trivial small solutions with respect to x_1 and x_2 . We define strong solutions of DAD systems as solutions of DAD systems for all t and we also formulate weak observability of strong small solutions with respect to x_2 .