Positive observability of linear systems on time scales

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We study the problem of positive observability of a linear positive system Σ : $x^{\Delta}(t) = A(t)x(t)$, $y(t) = C(t)x(t)$, on an arbitrary time scale $\mathbb{T}$. Positive observability means that the state $x(t)$ of the system can be recovered from the output $y(t)$ via a linear map given by an integral operator with a positive kernel. This property was characterized in [1] for systems with constant matrices A and C. Here we extend this result to the case when A and C depend on time. As in [1] the main tool used in the paper is the modified Gram matrix of the system computed on some interval $[t_0, t_1]$. It involves only certain rows of the matrix C. Then the positive observability is equivalent to the fact that the modified Gram matrix has a positive inverse.

[1] Z. Bartosiewicz, Observability of linear positive systems on time scales, Proceedings of the 51st IEEE Conference on Decision and Control, Maui, Hawaii, December 10-13, 2012, 2581-2586.