ON THE RELATION BETWEEN CONSISTENT AND NON-CONSISTENT INITIAL CONDITIONS OF SINGULAR DISCRETE TIME SYSTEMS

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Abstract. In this article we focus our attention on the relation between consistent and non-consistent initial conditions of a class of singular linear discrete time systems. First we analyze how both types of initial conditions are connected to the column vector space of the finite and the infinite eigenvalues of the related to the singular system matrix pencil and after we prove that a non-consistent initial condition can be viewed as the orthogonal projection of the sum of a consistent with a non-consistent initial value over a certain subspace.

Keywords. singular, linear, discrete time system, consistent, non-consistent, initial conditions
References


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Because of the algebraic relations between state variables, the system becomes singular and has specific behavior, different from ordinary systems, for example, impulsive behavior in continuous time case or noncausal behavior in discrete time case. So it is necessary to generalize mathematical methods, developed for ordinary systems. This paper generalizes anisotropy-based bounded real lemma on descriptor systems. II. Now, we provide some background material on the anisotropic analysis of linear discrete systems. The concepts of the mean anisotropy of Gaussian random sequences and of the anisotropic norm of linear systems were introduced in [1]. Let square integrable vectors $W = (w_k)_{k \geq 0}$ be a stationary sequence of with values in $\mathbb{R}^m$, which. Discrete-Time Signals and Systems. Luis F. Chaparro, Aydin Akan, in Signals and Systems Using MATLAB (Third Edition), 2019. Causality. It is customary to distinguish between LSI filters (systems) that have an impulse response of finite or infinite duration. The first type is called FIR (finite-length impulse response) filters since the impulse response becomes zero after a finite number of samples. If a discrete-time system is causal, then the current output sample depends only on the current and past input samples and not on future samples. This definition is now examined in the case of an LSI system with an impulse response $h[n]$. The output $y[n]$ of an LSI system can be expressed as a linear singular discrete time system and a linear singular fractional discrete time system whose coefficients are square constant matrices.