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A "NATURAL" STATE-SPACE FOR AN AEROELASTIC CONTROL SYSTEM

TERRY L. HERDMAN AND JANOS TURI

ABSTRACT. In [**16**] a set of sufficient conditions was formulated to guarantee the "proper" invertibility of a finite Hilbert transform appearing in the derivation of a dynamic model for an aeroelastic system. Here we outline how these conditions, with some modification, can be used to construct a "natural" (i.e., motivated by the model derivation) state-space, appropriate for control design purposes. In the process we also provide a detailed discussion on a somewhat "controversial" statement in [**16**].

1. Introduction. Well posed state-space formulations for control systems governed by singular integro-differential equations have been studied in a sequence of papers, [**6, 15, 7, 13, 8, 14**], hoping to achieve the following objectives: (i) find an (infinite dimensional) state-space such that the control problem for the singular integro-differential equation can be equivalently formulated as the abstract Cauchy problem

$$\dot{z}(t) = \mathcal{A}z(t) + \mathcal{B}u(t), \qquad z(0) = z_0, \tag{1.1}$$

where the linear operator $\mathcal{A}$ is the infinitesimal generator of a C_0-semigroup on the selected state-space; (ii) make the selection in (i) in such a way that $\mathcal{A}$ in (1.1) satisfies a dissipative estimate on the selected space.

To summarize the findings of the papers listed above, we note that for a large class of singular integro-differential equations of neutral type the well-posedness (i.e., (i)) has been established on state-spaces of the type $R^n \times L_{p,g}$, where $g(\cdot)$ denotes a weight function. To achieve objective (ii) one has to find the appropriate weight function which is not straightforward in the sense that there is no systematic procedure

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