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Matrix pencils and structural invariants associated to quadruples of matrices representing generalized linear multivariable dynamical systems

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ABSTRACT

Quadruples of matrices representing generalized linear multivariable dynamical systems of the form

$$\begin{cases} E\dot{x}(t) = Ax(t) + Bu(t) \\ y(t) = Cx(t) \end{cases}$$

where $E, A \in M_n(C)$, $B \in M_{n\times m}(C)$, $C \in M_{p\times n}(C)$ are considered. Equivalent quadruples under the equivalence relation corresponding to standard transformations (bases changes for the state, control and output spaces, state and derivative feedback and output injection) are characterized as those with associated matrix pencils being "simultaneously equivalent". Structural invariants for a given quadruple are derived from this characterization.

Keywords: *Matrix pencils, Dynamical Systems, Structural Invariants*

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