



CONDENSED FORMS FOR LINEAR PORT-HAMILTONIAN DESCRIPTOR SYSTEMS*

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Abstract. Motivated by the structure which arises in the port-Hamiltonian formulation of constraint dynamical systems, structure preserving condensed forms for skew-adjoint differential-algebraic equations (DAEs) are derived. Moreover, structure preserving condensed forms under constant rank assumptions for linear port-Hamiltonian differential-algebraic equations are developed. These condensed forms allow for the further analysis of the properties of port-Hamiltonian DAEs and to study, e.g., existence and uniqueness of solutions or to determine the index. It can be shown that under certain conditions for regular port-Hamiltonian DAEs the strangeness index is bounded by $\mu \leq 1$.

Key words. Port-Hamiltonian system, Descriptor system, Differential-algebraic equation, Strangeness index, System transformation, Skew-adjoint pair of matrix functions, Condensed form.

AMS subject classifications. 34H05, 93A30, 93B11, 93B17, 93C05, 93C15.

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