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A DERIVATIVE ARRAY APPROACH FOR LINEAR SECOND ORDER DIFFERENTIAL-ALGEBRAIC SYSTEMS*

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Abstract. We discuss the solution of linear second order differential-algebraic equations (DAEs) with variable coefficients. Since index reduction and order reduction for higher order, higher index differential-algebraic systems do not commute, appropriate index reduction methods for higher order DAEs are required. We present an index reduction method based on derivative arrays that allows to determine an equivalent second order system of lower index in a numerical computable way. For such an equivalent second order system, an appropriate order reduction method allows the formulation of a suitable first order DAE system of low index that has the same solution components as the original second order system.

Key words. Differential-algebraic equation, Second order system, Index reduction, Order reduction, Strangeness index, Strangeness-free system.

AMS subject classifications. 65L80, 65L05, 34A09, 34A12.

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