

Adjoint pairs of differential-algebraic equations and Hamiltonian systems

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Abstract: We consider linear homogeneous differential-algebraic equations $A(Dx)'+Bx=0$ and their adjoints $-D*(A*x)'+B*x=0$ with well-matched leading coefficients in parallel. Assuming that the equations are tractable with index less than or equal to 2, we give a criterion ensuring the inherent ordinary differential equations of the pair to be adjoint each to other. We describe the basis pairs in the invariant subspaces that yield adjoint pairs of essentially underlying ordinary differential equations. For a class of formally self-adjoint equations, we characterize the boundary conditions that lead to self-adjoint boundary value problems for the essentially underlying Hamiltonian systems. © 2004 IMACS. Published by Elsevier B.V. All rights reserved.

Author Keywords: Adjoint pairs of differential-algebraic equations; Differential-algebraic equations; Self-adjoint boundary value problems

Index Keywords: Boundary conditions; Boundary value problems; Functions; Hamiltonians; Numerical analysis; Runge Kutta methods; Set theory; Adjoint pairs of differential-algebraic equations; Differential-algebraic equations; Self-adjoint boundary value problems; Self-adjoint equations; Differential equations

Year: 2005

Source title: Applied Numerical Mathematics

Volume: 53

Issue: 4-Feb

Page : 131-148

Cited by: 2

Link: Scopus Link

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ISSN: 1689274

CODEN: ANMAE

DOI: 10.1016/j.apnum.2004.08.015

Language of Original Document: English

Abbreviated Source Title: Applied Numerical Mathematics

Document Type: Conference Paper

Source: Scopus

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