Questions concerning differential-algebraic operators

Roswitha März (Humboldt-Universität zu Berlin, Institut für Mathematik)

The nature of differential-algebraic operators (DA operators) is constitutive for the direct treatment of differential-algebraic equations (DAEs) in function spaces. In particular, respective characteristics of the involved DA operators are responsible for both the effectiveness and the failure of direct discretizations of DAEs. In the first part we will concentrate on linear first-order higher-index DA operators acting in most natural Hilbert spaces. We provide their basic characteristics as well as the related background for the overdetermined least-squares polynomial collocation to work well. Respective numerical experiments are clearly promising. The inverse of an injective first-order higher-index DA operator and as the case may be the inverse of a injective composed DA operator involves again a DA-operator, but now it is a higher-order one. Higher-order DA operators arise also in different application. In our second part we will address characteristics of linear higher-order DA operators