

Preface of Surveys in Differential Algebraic Equations III

We are pleased to present the third volume of survey articles in various fields of differential-algebraic equations (DAEs), and we stress that a fourth volume will appear within the series “Differential-Algebraic Equations Forum”.

In this volume, we again extend the list of survey articles in the sense that they are of theoretical interest and equally relevant to applications.

The chapter “The Flexibility of DAE Formulations” shows that DAEs are not only the outcome of modeling; they may further lead to more elegant formulations in control and observer design problems, their numerical solution, and simulation. In the chapter “Reachability Analysis and Deterministic Global Optimization of DAE Models”, an overview on (optimal) control of parameterized DAEs is given. The chapter “Numerical Linear Algebra Methods for Differential-Algebraic Equations” is about numerical treatment of controller design and optimal control problems for large-scale differential-algebraic systems. The final chapter “Boundary-Value Problems for Differential-Algebraic Equations: A Survey” is a survey about boundary value problems for DAEs. Problems of this kind occur, for instance, in optimal control.

We hope that this issue will contribute to complete the picture of the latest developments in DAEs. The collection of survey articles may also indicate that DAEs are now an established field in applied mathematics.

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