

InitDAE: A new approach for the computation of consistent values, the index determination and the diagnosis of singularities of DAEs

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InitDAE is a prototype written in Python that computes consistent initial values of differential-algebraic equations (DAE), determines their index with a projector based decoupling and a related condition number that permits the diagnosis of singularities. The consistent initialization is determined using a projector based constrained optimization approach and the inherent differentiations required in the higher index case are provided by automatic differentiation (AD), using AlgoPy. Consequently, a detailed description of the local structural properties of the DAE becomes possible using the SVD. InitDAE has been conceived for academic purposes and is well-suited for examples of moderate size.

In this talk we give an overview of the used algorithms, demonstrate available features and discuss future possibilities, in particular the integration with Taylor series methods.