

Part III
Computational aspects

Part III is mainly devoted to computational aspects of the practical preparation of all ingredients of admissible matrix function sequences and the associated projectors. In particular one has to carry out matrix factorizations, rank calculations, and determinations of generalized inverses. Chapter 7 provides several versions to accomplish the basic step of the matrix function sequence from one level to the next. Moreover, a special more involved algorithm is developed for regular DAEs. The characteristic values arise as byproducts of matrix factorizations. From the numerical viewpoint, the widely orthogonal projector functions are favorably.

The second chapter sheds light on aspects of the direct numerical treatment of higher index DAEs, index monitoring, consistent initialization and numerical integration. Not surprisingly, the integration methods approved for regular index-1 DAEs not longer perform well or fail, if they are applied in the same way to general higher index DAEs, for instance to time-varying linear index-3 DAEs. This is due to the ill-posed character of the DAE solutions with respect to perturbations. Fortunately, exploiting special structural peculiarities, one can often create special methods for restricted classes of DAE.