

ERROR ESTIMATION OF THE PADÉ APPROXIMATION OF TRANSFER FUNCTIONS VIA THE LANCZOS PROCESS*

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Abstract. Krylov subspace based moment matching algorithms, such as PVL (Padé approximation Via the Lanczos process), have emerged as popular tools for efficient analyses of the impulse response in a large linear circuit. In this work, a new derivation of the PVL algorithm is presented from the matrix point of view. This approach simplifies the mathematical theory and derivation of the algorithm. Moreover, an explicit formulation of the approximation error of the PVL algorithm is given. With this error expression, one may implement the PVL algorithm that adaptively determines the number of Lanczos steps required to satisfy a prescribed error tolerance. A number of implementation issues of the PVL algorithm and its error estimation are also addressed in this paper. A generalization to a multiple-input-multiple-output circuit system via a block Lanczos process is also given.

Key words. Transfer function, Padé approximation, Lanczos process, linear system.

AMS subject classifications. Primary 41A21, 65F15, 65F10.

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