Advances on Evaluation of Matrix Polynomials Beyond the Paterson–Stockmeyer Method

J. Sastre [♭],[1]

(♭) Instituto de Telecomunicaciones y Aplicaciones Multimedia,
Universitat Politécnica de Valéncia. Camino de Vera s/n, 46022, Valencia, Spain.

Abstract

This paper resents recent advances on a method for matrix polynomial evaluation [1] more efficiently than the traditional state-of-the-art Paterson–Stockmeyer method [2, 3]. Applications to the Taylor polynomial approximation of matrix functions are shown. Their efficiency is compared with that of the state-of-the-art evaluation methods for polynomial approximations, rational approximations and a method based on mixed rational and polynomial approximations [4]. Since its publication in 1973, the Paterson–Stockmeyer method was considered the most efficient method for the evaluation of matrix polynomials. In this talk we show that this statement is no longer true. Moreover, since the 70's rational approximations were considered more efficient than polynomial approximations [5], although in the last years it has been shown that this was not always true in the computation of the matrix exponential and the matrix cosine [7, 6]. In this talk we show that polynomial approximations now provide a higher order of approximation than the state-of-the-art computational methods for rational approximations for the same cost in terms of matrix products, and applications are given.

References

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[1] jsastrem@upv.es