

MATRIX CONTINUED FRACTIONS RELATED TO FIRST-ORDER LINEAR RECURRENCE SYSTEMS*

P. LEVRIE^{†‡} AND A. BULTHEEL[†]

Abstract. We introduce a matrix continued fraction associated with the first-order linear recurrence system $Y_k = \theta_k Y_{k-1}$. A Pincherle type convergence theorem is proved. We show that the n -th order linear recurrence relation and previous generalizations of ordinary continued fractions form a special case. We give an application for the numerical computation of a non-dominant solution and discuss special cases where θ_k is constant for all k and the limiting case where $\lim_{k \rightarrow +\infty} \theta_k$ is constant. Finally the notion of adjoint fraction is introduced which generalizes the notion of the adjoint of a recurrence relation of order n .

Key words. recurrence systems, recurrence relations, matrix continued fractions, non-dominant solutions.

AMS subject classifications. 40A15, 65Q05.

*Received March 15, 1996. Accepted for publication May 31, 1996. Communicated by C. Brezinski.

[†]Department of Computing Science, K.U.Leuven, Celestijnenlaan 200A, B-3001 Heverlee, Belgium.

[‡]Departement IWT, Karel de Grote-Hogeschool, Campus KIHA, Salesianenlaan 30, B-2660 Hoboken, Belgium (paul@kiha.be).