

A direct solver to find hypergeometric solutions for coupled systems of difference equations

Moulay Barkatou¹, Mark van Hoeij², Johannes Middeke³, Carsten Schneider³
[jmiddeke@risc.jku.at]

¹ Université de Limoges, XLIM, 123, Av. A. Thomas, 87060 Limoges cedex, France

² Department of Mathematics, Florida State University, Tallahassee, FL 32306, USA

³ Research Institute for Symbolic Computation (RISC), Johannes Kepler University, Altenbergerstraße 69, 4040 Linz, Austria

We are looking for hypergeometric solutions of first order linear recurrence systems $\tau(Y) = MY$ where τ is a forward shift operator and M is a square invertible matrix with rational function entries. Our approach aims at reducing this problem to the computation of polynomial solutions of certain related first order linear systems similarly to Petkovšek's algorithm [1]. In particular, we want to avoid uncoupling the system.

Keywords

recurrence systems, direct solving, hypergeometric solutions

References

[1] M. PETKOVŠEK, Hypergeometric solutions of linear recurrences with polynomial coefficients. *Journal of Symbolic Computation* (14), 243–264 (1992)