LINDALG: MATHEMAGIX Package for Symbolic Resolution of Linear Differential Systems with Singularities

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LINDALG is dedicated to the local analysis of nth-order linear differential equations and first order linear differential systems. At ordinary points, it suffices to consider Taylor series (power series). Any engineering student or scientist is familiar with their resolution procedure and popular computer systems always consider a package for this goal. However, singular points require further investigation based on an analysis of a Newton polygon and matricial manipulations. Differential equations with singularities arise from countless applications and encompass a vast body of contemporary academic literature (see, e.g. [1, 7]). The package ISOLDE [4] written in the computer algebra system MAPLE is dedicated to the symbolic resolution of such systems and more generally linear functional matrix equations (e.g. difference equations).

On the other hand, the new package LINDALG [6] sets a first milestone in providing the two-decade span of ISOLDE content in an open source software. MATHEMAGIX [5] provides under GNU General Public License, a new high level general purpose language, for symbolic and certified numeric algorithms, that can be both interpreted by a shell or compiled.

References

[1] W. Balser. Formal Power Series and Linear Systems of Meromorphic Ordinary Differential Equations. *Springer-Verlag*, New York, 2000.

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[3] M. Barkatou, *A Rational Version of Moser's Algorithm*, in Proceedings of the International Symposium on Symbolic and Algebraic Computation, pp 297-302, ACM Press, July (1995).

[4] M. Barkatou and E. Pfluegel, ISOLDE: Integration of Systems of Ordinary Linear Differential Equations. Available at: http://isolde.sourceforge.net/

[5] J. van der Hoeven, G. Lecerf, B. Mourrain, et al. Mathemagix, 2002. Software available from $http://www.mathemagix.org$.

[6] More information available at: $http://www.unilim.fr/pages\_perso/suzy.maddah/$

[7] W. Wasow. Asymptotic Expansions for Ordinary Differential Equations. *Dover Phoenix Editions*, 2002.