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Random matrices over a DVR and LU factorization. (English) Zbl 1316.65038

J. Symb. Comput. 71, 98-123 (2015).

Summary: Let R be a discrete valuation ring (DVR) and K be its fraction field. If M is a matrix over R admitting an LU decomposition, it could happen that the entries of the factors L and U do not lie in R, but just in K. Having a good control on the valuations of these entries is very important for algorithmic applications. In the paper, we prove that on average these valuations are not too large and explain how one can apply this result to provide an efficient algorithm computing a basis of a coherent sheaf over $\mathbb{A}^1_K$ from the knowledge of its stalks.

MSC:

65F05 Direct numerical methods for linear systems and matrix inversion
16W60 Valuations, completions, formal power series and related constructions (associative rings and algebras)

Cited in **2** Documents

Keywords:

p-adic precision; LU factorization; discrete valuation ring; fraction field; algorithm

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