Matrix polynomials
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Minimal bases
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New elimination
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Alternative to Gaussian elimination

September 23rd, 2020

Matrix polynomials
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Minimal bases
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New elimination
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Overview

Matrix polynomials

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Matrix polynomials

$A \in \mathsf{K}[x]^{n \times n}$ of degree d

$$\det A(x) = \sum_{\sigma} \prod_{i=1}^{n} A_{\sigma(i),i}$$

$$\deg \det A \leq nd$$

Matrix polynomials
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$A \in \mathbb{Z}[x]^{n \times n}$ with entries of absolute values less than b

$$\det A = \prod_{j=1}^{n} \|A_j^*\| \leq \prod_{j=1}^{n} \|A_j\| \leq b^n n^{n/2}$$

For input size β:

$$\log \det A \leq n\beta + O(n \log n)$$

▶ Hadamard's conjecture

$a_{i,j} \in \{1, -1\}$ and the rows of A are mutually orthogonal

A Hadamard matrix of dimension n exists for every n multiple of 4