

Two methods of solving linear second-order differential equations with Dirichlet boundary conditions

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Abstract

1 Introduction

2 Methods

3 Results

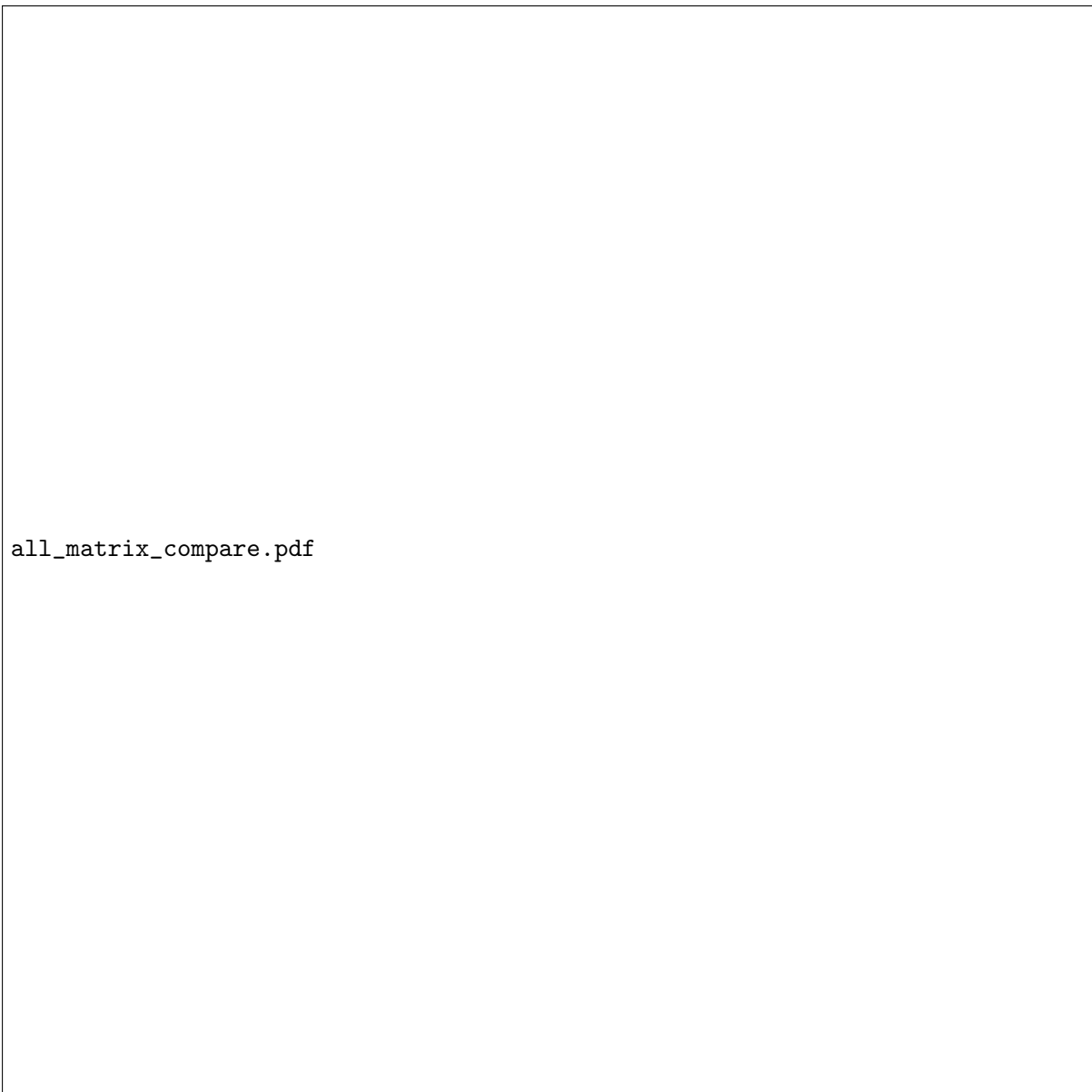
n	t_g/t_s	t_{LU}/t_s
10	2.08	3.70
10 ²	1.89	1.00 · 10 ²
10 ³	1.48	1.05 · 10 ⁴
10 ⁴	1.43	1.18 · 10 ⁶
10 ⁵	1.39	-
10 ⁶	1.41	-
10 ⁷	1.39	-

Table 1: Ratio between CPU time for the general algorithm (**t_g**), the special algorithm (**t_g**) and the LU decomposition algorithm (**t_{LU}**) for different matrix sizes (**n**). The LU decomposition crashed for **n** greater than 10⁴.

4 Discussion

A

$$A = \begin{bmatrix} b_1 & c_1 & 0 & \dots & \dots & 0 \\ a_1 & b_2 & c_2 & 0 & \dots & 0 \\ 0 & a_2 & b_3 & c_3 & \dots & 0 \\ \vdots & \ddots & \ddots & \ddots & \ddots & \vdots \\ 0 & \dots & \ddots & a_{n-2} & b_{n-1} & c_{n-1} \\ 0 & \dots & \dots & 0 & a_{n-1} & b_n \end{bmatrix},$$



all_matrix_compare.pdf

Figure 1: The numeric solution using different solving algorithms. The graphs for $n=100$ and $n=1000$ are so similar that they are not distinguishable.