Lomonosov Moscow State University

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"Matrix to hessenberg form"

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Setting the task

1) Write a program that will reduce a square matrix to a Hessenberg form.
2) Test the program for correctness.
3) Identify the complexity of the program.

Description of the program

The program receives an input:

1) Size of the square matrix ($size_of_matrix - 1$);

2) Matrix written in columns in the form of a vector $size_of_matrix * size_of_matrix$;

3) An array of length $(size_of_matrix - 1) * (size_of_matrix - 2)$ storing reflection vectors;

4) a vector of size $size_of_matrix - 2$ storing the norms of reflection vectors.

The program converts the matrix to a Hessenberg form by sequentially multiplying the matrix by the reflection vectors on the right and left.

Testing

The program was tested in the following way:

1) The final matrix was multiplied by reflection vectors.

2) The resulting matrix was compared with the original Frobenius norm divided by the final Frobenius norm.

$$\frac{||A_0 - A||_2}{||A_0||_2}$$

Graph without using LAPACK

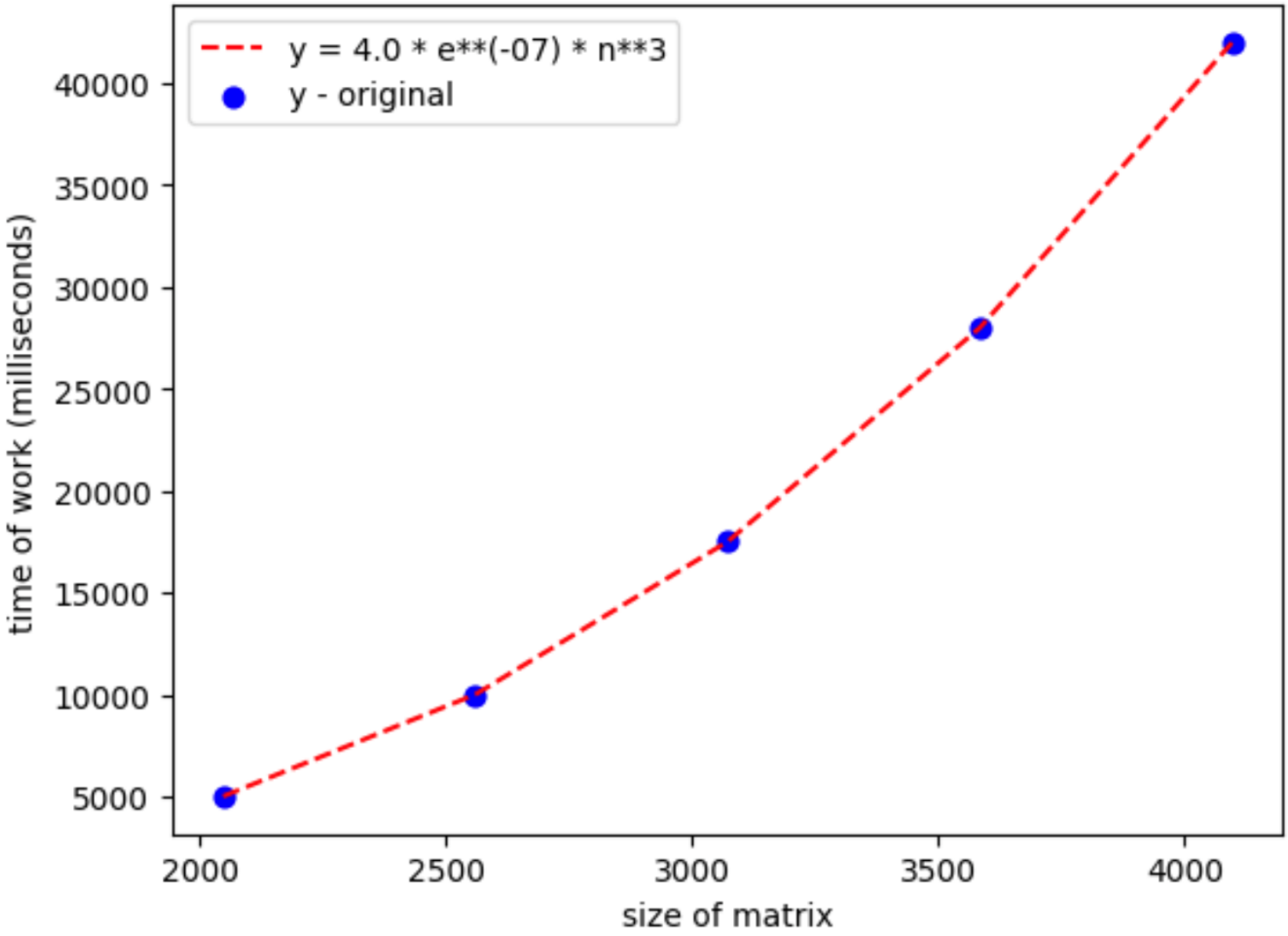
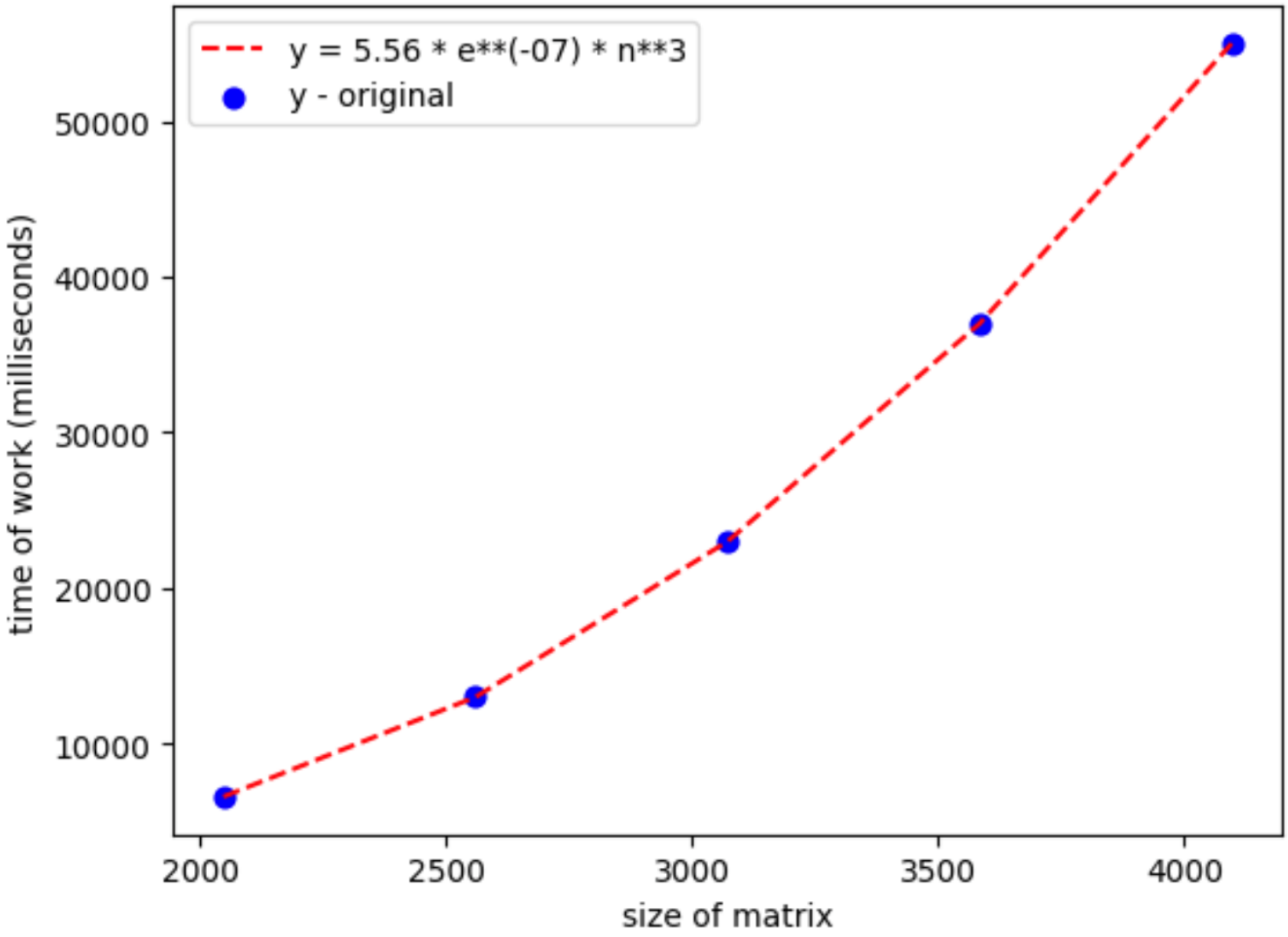


Рис.: Enter Caption

Graph with using LAPACK



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