

# AN ITERATIVE METHOD FOR DIAGONALIZATION OF THE FROBENIUS COMPANION MATRIX\*

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## Abstract

In this work, we develop a new and efficient iterative method for diagonalization of the Frobenius companion matrix. The method can be used for approximating all of the eigenvalues and corresponding eigenvectors. It can also be used for simultaneous inclusion of all simple zeros of the corresponding characteristic polynomial. Local convergence analysis of the method is included. We prove that it is locally quadratically convergent. Some numerical examples demonstrating effectiveness of the proposed iterative method are also included.

MSC: 65H04, 65H05, 65F15

**keywords:** Frobenius companion matrix, Eigen-decomposition, Iterative diagonalization, Polynomial zeros, Rayleigh quotient.

## 1 Introduction

This section gives a very short overview of the theory from the linear algebra concerning the matrix spectral decomposition and diagonalization.

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