

A Brief review of the iterative methods for solving Toeplitz systems

F. Toutounian

School of Mathematical Sciences, Ferdowsi University of Mashhad,
P.O. Box 1159-91775, Mashhad, Iran

E-mail: toutouni@math.um.ac.ir

Abstract

In this expository paper, we survey some of the latest development in using preconditioned conjugate gradient methods and splitting methods for solving Toeplitz systems. One of the main results is that the complexity of solving a large class of $n \times n$ Toeplitz systems is reduced to $O(n \log n)$ operations as compared to $O(n \log^2 n)$ operations required by fast direct Toeplitz solvers. Different preconditioners proposed for Toeplitz systems are reviewed. Moreover, the circulant and skew-circulant splitting methods are studied for Toeplitz systems. Numerical examples are presented to demonstrate the methods.

Keywords: Toeplitz; Preconditioned conjugate methods; Preconditioners; Circulant; Skew circulant; Splitting; Iterative methods.

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