Preconditioning techniques based on the Birkhoff–von Neumann decomposition

Michele Benzi[*]   Alex Pothen[†]   Bora Uçar[‡]

Abstract

We introduce a class of preconditioners for general sparse matrices based on the Birkhoff–von Neumann decomposition of doubly stochastic matrices. These preconditioners are aimed primarily at solving challenging linear systems with highly unstructured and indefinite coefficient matrices. We present some theoretical results and numerical experiments on linear systems from a variety of applications.

[*]Department of Mathematics and Computer Science, Emory University, Atlanta, USA (benzi@mathcs.emory.edu).

[†]Department of Computer Science, Purdue University, West Lafayette, USA (apothen@purdue.edu).

[‡]CNRS and LIP, ENS Lyon, France (bora.ucar@ens-lyon.fr)