

Schwarz iterations for singular systems of Markov chains

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Abstract

A convergence analysis is presented for additive Schwarz iterations when applied to consistent singular systems of equations $Ax = b$. The theory applies to singular M -matrices with one-dimensional null space, and is applicable in particular to systems representing ergodic Markov chains. The results are based on an algebraic formulation of Schwarz methods, in particular the convergence theorem for additive Schwarz iterations and the existence of a splitting of the matrix A with the same iteration matrix as the additive Schwarz scheme. This work complements the results of [Marek and Szyld, *LAA*, in press], where multiplicative Schwarz iterations are shown to converge for singular systems.

Keywords

Schwarz method, Markov chains, Iterative methods.

References:

Marek, I. and B.D. Szyld (2004). Algebraic Schwarz Methods for the Numerical Solution of Markov Chains, *Linear Algebra Appl.* 386, 67-81.