Spielman, Daniel A.; Teng, Shang-Hua
Nearly-linear time algorithms for graph partitioning, graph sparsification, and solving linear systems. (English) Zbl 1192.65048

From the text: “We present a linear-system solver that, given an $n \times n$ symmetric diagonally-dominant matrix $A$ with $m$ non-zero entries and an $n$-vector $b$, produces a vector $\tilde{x}$ satisfying $A\tilde{x} - b < \epsilon$ and $\tilde{x} - x < \epsilon$, where $x$ is the solution to $Ax = b$, in time linear in $m$ and $\log(\kappa_f(A)/\epsilon)$, where $\kappa_f(A)$ is the condition number of $A$. Our algorithm applies the preconditioned Chebyshev iteration with preconditioners designed using nearly-linear time algorithms for graph sparsification and graph partitioning.

For the entire collection see [Zbl 1074.68504].

MSC:
65F30 Other matrix algorithms (MSC2010)
15A06 Linear equations (linear algebraic aspects)
05C85 Graph algorithms (graph-theoretic aspects)
05C70 Edge subsets with special properties (factorization, matching, partitioning, covering and packing, etc.)
68R10 Graph theory (including graph drawing) in computer science

Full Text: DOI Link