

Incomplete Cholesky Parallel Preconditioners with Selective Inversion

Esmond G. Ng¹ and Padma Raghavan²

¹ Lawrence Berkeley National Laboratory

² The University of Tennessee, Knoxville

Abstract. Consider the solution of a large linear system when the coefficient matrix is sparse, symmetric, and positive definite. One approach is the method of “conjugate gradient” (CG) with an incomplete Cholesky (IC) preconditioner (ICCG). A key problem with the design of a parallel ICCG solver is the bottleneck posed by repeated parallel sparse triangular solves to apply the preconditioner. Our work concerns the use of “selective inversion” techniques to replace parallel substitution schemes (for triangular solution) by efficient, scalable matrix-vector multiplication. We report on the performance of our parallel solver by summarizing results of experiments on both SMPs and message-passing multiprocessors.