Two Cosmid

Two Components

① Smoother (ILU, SOR, Jacobi): B_s

② Coarse-Grid Correction : B_c

$$B^{-1} = B_s^{-1} + B_c^{-1} - B_s^{-1} A B_c^{-1}$$

[This satisfies: $(I - B^{-1}A) = (I - B_s^{-1}A)(I - B_c^{-1}A)$]

$$B_c = \underbrace{P(P^T A P)P^T}_{\approx}$$

A_c : coarse grid

$$B_c^{-1} = P\,(P^T A P)^{-1} P^T$$

$$B_c^{-1}x = P\,\underbrace{(P^T A P)}_{pcg(A, L, td, n, @pre\text{-}solve)}\Big(\underbrace{A_c}\Big)^{-1}\Big((P^T x)\Big)$$

% test.m

$=$ $=$ $=$

$=$ $=$

$=$ $=$

function y = pre-solve (x)

$y \leftarrow B^{-1}x$

$\parallel$

end

$B_s^{-1}x + B_c^{-1}x - B_s^{-1}AB_c^{-1}x$

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1 — !
2 — !
3 — 2
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P = Sparse (nonzeros)

$P = \text{Sparse}(na, nc)$

nc: nparts
$=$ no. of aggregation

$n =$ no. of rows of A

$10,000 \rightarrow 2000$

for $i = 1 : n$
$\quad P(i, p(i)) = 1$
end

$P(1:n, p(1:n)) = 1$

$$\begin{bmatrix} f \\ x & x \\ . \end{bmatrix}$$