
$$r_0 = b - Ax_0$$

$$z_0 = M^{-1}r_0$$

$$p_0 = z_0$$

$$k = 0$$

while have not converged **do**

$$\alpha_k = \langle r_k, z_k \rangle / \langle p_k, Ap_k \rangle$$

$$x_{k+1} = x_k + \alpha_k p_k$$

$$r_{k+1} = r_k - \alpha_k Ap_k$$

$$z_{k+1} = M^{-1}r_{k+1} \leftarrow A_s x_s^{(k+1)} = r^{(k)} + A_s x_s^{(k)}$$

only first cycle, zero initial guess, iterate a fixed number of times

$$\beta_k = \langle z_{k+1}, r_{k+1} \rangle / \langle z_k, r_k \rangle$$

$$p_{k+1} = z_{k+1} + \beta_k p_k$$

$$k = k + 1$$

end while
