GMRES Préconditionné à gauche

voir aussi le livre de Y. Saad, Iterative methods for sparse linear systems, second edition, page 282.

Algorithm 1 Left Preconditionned GMRES

Set the initial guess x_0
Compute $r_0 = M^{-1}(b - Ax_0)$
$\beta = \|r_0\|$
$v_1 = r_0/\beta$;
normR $= \beta$
normRHS $= \|M^{-1}b\|$
normB $= \|b\|$
$j = 0$
convergence = false
while (not convergence) **and** ($j <$ max_it) **do**
  $j = j + 1$
  $w = M^{-1}Av_j$
  for $i = 1, \ldots, j$ **do**
    $h_{i,j} = v_i^T w$
    $w = w - h_{i,j}v_i$
  end for
  $h_{j+1,j} = \|w\|$
  $v_{j+1} = w/h_{j+1,j}$
  Solve the least-squares problem $y_j = \arg\min \|\beta e_1 - \bar{H}_j y\|$
  $x_j = x_0 + V_j y_j$
  Compute $normR = \|M^{-1}(b - Ax_j)\| = \|\beta e_1 - \bar{H}_j y_j\|$
  convergence = (normR / normRHS) $\leq \epsilon$
end while