

diplom

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Algorithm 1 BCG

Require: $A \in R^{n \times n}, B \in R^{n \times m}$

$$R_0 = B - AX_0$$

$$P_1 = R_0 S_0$$

▷ $S_0 \in R^{r \times m}$ - select matrix

while $iter < maxiter$ **do**

$$\alpha_k = (P_k^* A P_k)^{-1} P_k^* R_{k-1}$$

$$X_k = X_{k-1} + P_k \alpha_k$$

$$R_k = R_{k-1} - A P_k \alpha_k$$

$$R_k S_{k-1} = Q_k T_k M_k$$

▷ PQR decomposition

$$ind \leftarrow i : |diag(T_k)_i| < eps$$

if $ind == len(diag(T_k))$ **then**

$$\beta_k = (P_k^* A P_k)^{-1} P_k^* A R_{k-1} S_k$$

$$P_{k+1} = R_k S_k - P_k \beta_k$$

else

\hat{M} is first ind columns of M

with \hat{S}_k select new columns from R_k

$$S_k = [S_{k-1} \hat{M}_k^T \hat{S}_k]$$

$$P_k M_k^T = [\hat{P}_k \tilde{P}_k] \tilde{R}_k$$

▷ QR decomposition with A-scalar product

$$V_k = [V_{k-1} \tilde{P}_k]$$

$$\beta_k = \tilde{P}_k^* R_k S_k$$

$$\gamma = V_k^* R_k S_k$$

$$P_{k+1} = R_k S_k - \hat{P}_k \beta_k - V_k \gamma_k$$

end if

end while
