We now make a comparison between the cases where $p = 1$ and $p = m$. For convenience, we assume that $\sigma_n^2(A) - \|B\|_2^2 = 1$. The convergence factors for the cases $p = 1$ and $p = m$ are $1 - \frac{1}{\|A\|_F^2}$ and $1 - \frac{1}{\|A\|_2^2}$, respectively. Using the inequality $1 - \iota \leq e^{-\iota}$ for any $\iota \in (0, 1)$, RABK with $p = 1$ and $p = m$ requires

$$\mathcal{O}\left(\|A\|_F^2 \log\left(1/\varepsilon\right)\right) \quad \text{and} \quad \mathcal{O}\left(\|A\|_2^2 \log\left(1/\varepsilon\right)\right)$$

iterations, respectively, to achieve an accuracy of $\varepsilon$ in terms of the expected error norm. Since the computational cost for the case $p = m$ at each step is about $m$-times as expensive as that for the case $p = 1$, a fair comparison should be made between $\mathcal{O}\left(\|A\|_F^2 \log(1/\varepsilon)\right)$ and $\mathcal{O}\left(m\|A\|_2^2 \log(1/\varepsilon)\right)$. Given that $\|A\|_F^2 \leq m\|A\|_2^2$, the RABK method with $\tau = 1$ converges faster in theory than with $\tau = m$ for solving the GAVE (1.1). However, we note that one can use the parallelization technique to speed-up the iteration scheme (5.5) in terms of the total running time.