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Analytical solutions of a class of matrix function optimization problems with unitary constraints. (English)


Summary: In this paper we extend Theorems 3.1 and 3.2 of Xu et al. (2020) to more general cases and propose analytical solutions of the following constrained matrix maximization problems with unitary constraints:

\[
\begin{align*}
\max_{S_k S_k^H = I_n, L_k L_k^H = I_m} & \quad \left| \det \left( cI_m + \prod_{k=1}^s A_k S_k B_k L_k \right) \right| \\
\max_{S_k S_k^H = I_n, L_k L_k^H = I_m} & \quad \left| \text{tr} \left( cI_m + \prod_{k=1}^s A_k S_k B_k L_k \right) \right|
\end{align*}
\]

where \( c \) is a complex number, \( I_m \) denotes the \( m \)-order identity matrix, \( A_k, B_k \) are \( m \times n \) and \( n \times m \) complex matrices, and \( \det(\cdot), \text{tr}(\cdot) \) denote the matrix determinant and trace functions. This is a non-convex nonlinear constrained matrix maximization problem. The new results improve the corresponding existing ones in Xu et al. (2020).

MSC:

90Cxx Mathematical programming
15-XX Linear and multilinear algebra; matrix theory

Keywords:

unitary constraints; maximization problems; determinant function; trace function

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References:


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