1046-46-1140 **Alberto A. Condori*** (condoria@msu.edu), Department of Mathematics, Michigan State University, East Lansing, MI 48824. *On the sum of superoptimal singular values.* Preliminary report.

We discuss the following extremal problem and its relevance to the sum of the so-called superoptimal singular values of a matrix function: Given an $m \times n$ matrix function Φ on the unit circle T, when is there a matrix function Ψ_* in the set $A_k^{n,m}$ such that

$$\int_T \operatorname{trace}(\Phi(\zeta)\Psi_*(\zeta))dm(\zeta) = \sup_{\Psi \in A_k^{n,m}} \left| \int_T \operatorname{trace}(\Phi(\zeta)\Psi(\zeta))dm(\zeta) \right| ?$$

The set $A_k^{n,m}$ is defined by

$$A_k^{n,m} = \left\{ \Psi \in H_0^1 : \|\Psi\|_{L^1} \leq 1, \operatorname{rank}\Psi(\zeta) \leq k \text{ a.e. } \zeta \in T \right\}.$$

We introduce Hankel-type operators on spaces of matrix functions and prove that this problem has a solution if and only if the corresponding Hankel-type operator has a maximizing vector. We also characterize the smallest number k for which

$$\int_T \operatorname{trace}(\Phi(\zeta)\Psi(\zeta))dm(\zeta)$$

equals the sum of all the superoptimal singular values of an admissible matrix function Φ for some $\Psi \in A_k^{n,m}$. Moreover, we provide a representation of any such function Ψ when Φ is an admissible very badly approximable unitary-valued $n \times n$ matrix function. (Received September 14, 2008)