1098-00-209 **Alexander Tovbis*** (alexander.tovbis@ucf.edu), Orlando, FL 32816, **Marco Bertola**, Montreal, Quebec , Canada, and **Alexander Katsevich**, Orlando, 32816. *Singular value decomposition of a finite Hilbert transform defined on several intervals and the interior problem of tomography with prior knowledge: the Riemann-Hilbert problem approach.*

We study the asymptotics of singular values and singular functions of a Finite Hilbert transform (FHT), which is defined on several intervals $I$. Transforms of this kind arise in the study of the interior problem of tomography, in particular, interior problem with the prior knowledge. We suggest a novel approach based on the technique of the matrix Riemann-Hilbert problem (RHP) and the nonlinear steepest descent method of Deift-Zhou. In particular, the SVD problem is reduced to the family of RHPs with a spectral parameter $\lambda$, and the singular values corresponds to the values of $\lambda$ when the RHP has no solution. The nonlinear steepest descent method is used to calculate the asymptotics of singular values and singular functions. The answers are obtained in terms of the hyperelliptic Riemann surface $\mathcal{R}$, associated with intervals $I$, which include normalized holomorphic differentials and Riemann Theta function on $\mathcal{R}$. (Received January 26, 2014)