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**Ethan Dudley\*** (etdudley@ncsu.edu), **Arvind Saibaba** and **Alen Alexanderian**. *Monte Carlo Estimators for the Schatten-p Norm*.

Computing the Schatten-p norm of a positive semidefinite matrix is important to scientific computing. Our motivation stems from optimal experimental design, where the Schatten-p norm defines a design criterion, known as P-optimal criterion. When the matrix is large, computing the Schatten-p norm is computationally expensive as it requires computing all the eigenvalues of the matrix. We propose a matrix-free method to estimate the Schatten-p norm using a Monte Carlo estimator and derive a bound on the number of samples to accurately estimate the Schatten-p norm with a given probability. To efficiently compute the Schatten-p norm for large values of p, we use a low order Chebyshev polynomial approximation and extend our error analysis to this case as well. Finally, since the Schatten-p norm converges to the spectral norm as  $p \rightarrow \infty$ , we discuss the accuracy of the Monte Carlo estimators for the spectral norm. We demonstrate the performance of our proposed estimators on several test matrices and through an application to optimal experimental design of inverse problems. (Received September 15, 2019)