1106-65-1670 **Paul G Constantine*** (pconstan@mines.edu), 1500 Illinois St, Stratton Hall, Rm 217, Golden, CO 80211, and **David F Gleich** (dgleich@purdue.edu), Lawson Computer Science Building, 1207, 305 N. University Ave., West Lafayette, IN 47907. *Computing Active Subspaces.* Preliminary report.

Complex models in science and engineering commonly contain functions of several variables, $f(\mathbf{x})$. The active subspace is the span of the first few eigenvectors of the average outer product of the gradient $\nabla f(\mathbf{x})$ with itself. Perturbations in $\mathbf{x}$ along these eigenvectors change f more, on average, than $\mathbf{x}$ perturbations orthogonal to the eigenvectors. Discovering the active subspace can reduce the dimension of parameter studies—e.g., by ignoring directions that change f relatively little—enabling otherwise infeasible computations. We employ non-asymptotic random matrix theory to analyze a Monte Carlo method for discovering the active subspace. With these tools, we try to answer, how many potentially expensive gradient samples are needed to accurately approximate the active subspace? (Received September 14, 2014)