1163-49-466   **Shaofeng Deng*** (`sfdeng@math.ucdavis.edu`), **March Boedihardjo** and **Thomas Strohmer**.
A Performance Guarantee for Spectral Clustering.

The two-step spectral clustering method, which consists of the Laplacian eigenmap and a rounding step, is a widely used method for graph partitioning. It can be seen as a natural relaxation to the NP-hard minimum ratio cut problem. In this talk we consider the central question: when is spectral clustering able to find the global solution to the minimum ratio cut problem? First we provide a condition that naturally depends on the intra- and inter-cluster connectivities of a given partition under which we may certify that this partition is the solution to the minimum ratio cut problem. Then we give a deterministic two-to-infinity norm perturbation bound for the the invariant subspace of the graph Laplacian that corresponds to the k smallest eigenvalues. Finally by combining these two results we give a condition under which spectral clustering is guaranteed to output the global solution to the minimum ratio cut problem, which serves as a performance guarantee for spectral clustering. (Received September 07, 2020)