1085-65-125 **Naoki Saito*** (saito@math.ucdavis.edu), **Yuji Nakatsukasa** and **Ernest Woei**. *Graphs that possess a Laplacian eigenvalue exactly equal to 4.*

It is well known that the eigenvalues of the Laplacian matrix $L(G)$ of a given graph G reflect various geometric and topological information about G. What is lesser known is that for an unweighted tree, the Laplacian eigenvalue $\lambda = 4$ serves as a threshold for the phase transition phenomenon: the eigenvectors of $L(G)$ corresponding to $\lambda < 4$ oscillate *semi-globally* (like Fourier modes) while those for $\lambda > 4$ are *localized* and *concentrated* (like wavelets) around junctions (i.e., branching vertices). In this talk, we will discuss our current understanding on graphs that possess a Laplacian eigenvalue *exactly equal to 4*. In particular, we will discuss two such classes of special trees as well as a class of finite lattice graphs (i.e., the Cartesian product of path graphs) including their interesting behaviors. (Received September 05, 2012)