SOME RESULTS ON OPTIMIZING EVENNESS OF SETS OF VERTICES. Neal O. Bushaw, Brent M. Cody & Christopher T. Leffler, Virginia Commonwealth University. Maximally even subsets of cycle graphs are those with their vertices spaced out as evenly as possible. The study of these sets arose in Clough and Douthett’s work on music theory, are found in scales and rhythms from all over the world. Additionally, maximally even sets have found applications in physics, mathematics, and the design of particle accelerators. To what extent can the study of maximally even subsets of cycles be extended to other finite simple connected graphs? We compare and contrast several new measures of evenness. For example, the Wiener Index of a set of vertices is the sum of all pairwise distances between vertices from the set. The larger the Wiener Index of a set with a given size, the more evenly spaced out the vertices. We provide several characterizations of sets of vertices which maximize the Wiener Index for cycle graphs and path graphs, i.e. a set of vertices on a cycle graph maximizes the Wiener Index if and only if it satisfies a certain balanced condition. Motivated by the definition of electric potential energy, we define the energy of a set of vertices to be the sum of the reciprocals of the pairwise distances between the vertices in the set. We prove that a subset of a cycle graph minimizes the energy function if and only if it is a maximally even set. (Supported By: Virginia Commonwealth University, College of Humanities and Sciences Seed Award). Author contact: [lefflerc@vcu.edu](mailto:lefflerc@vcu.edu).