1154-94-1469 **R Oliver VandenBerg*** (vandenberg1@kenyon.edu), 1910 El Dorado Dr SE, Grand Rapids, MI 49506, and **Nuh Aydin** (aydinn@kenyon.edu). *A New Algorithm for Equivalence of Cyclic Codes and Its Applications.*

Cyclic codes are among the most important families of codes in algebraic coding theory for both theoretical and practical reasons. They can be viewed as building blocks of other useful codes such as Quasi-cyclic (QC) codes that contain many codes with best known parameters. Another fundamental notion in coding theory is the notion of code equivalence. Some results on equivalence of cyclic codes were obtained by previous researchers. In this work we obtain new results on this topic with useful practical implications for computer search algorithms. We prove that existence of certain maps between the roots of the generating polynomials (or cyclotomic cosets) of cyclic codes is sufficient for the codes being equivalent. The existence of this map can be checked very quickly in contrast to the difficulty of checking code equivalence in general. Therefore, it can be used to build a partitioning algorithm for equivalence classes of cyclic codes, which can greatly reduce redundancy in certain search algorithms for new codes. Implementing this idea, we already found new linear codes that are cyclic. These results may also be useful for other applications such as code-based cryptography. (Received September 15, 2019)