On cyclic decompositions of complete digraphs into antidirected cycles

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An antidirected cycle on n vertices, denoted AC_n, is a digraph which is obtained from orienting the edges of an n-cycle such that no directed 2-path is contained as a subgraph. The complete digraph on n vertices, denoted K_n^*, is the digraph obtained from K_n by replacing each edge with a directed 2-cycle. Given a digraph D, a D-decomposition of K_n^* is a partition of the arcs of K_n^* into subgraphs, called blocks, each of which is isomorphic to D. A graph decomposition is called *cyclic* if the blocks of the decomposition are preserved by the permutation $(0, 1, 2, \ldots, n-1)$, where $V(K_n^*) = \mathbb{Z}_n$.
Cyclic decompositions are often obtained by using graph labelings. In this talk we discuss how some traditional graph labelings can be extended to construct cyclic AC_n-decompositions of K_{nx+1}^* for every positive integer x. We establish some sufficient conditions conditions for the existence of such a cyclic decomposition. This work was completed as part of the *Illinois State University REU for Pre-service and In-service Secondary Mathematics Teachers*.