On cyclic decompositions of complete graphs into tripartite graphs

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A labeling (or valuation) of a graph G is an assignment of integers to the vertices of G subject to certain conditions. A hierarchy of graph labelings was introduced by Rosa in the late 1960s. Rosa showed that certain basic labelings of a graph G with n edges yielded cyclic G-decompositions of K_{2n+1} while other stricter labelings yielded cyclic G-decompositions of K_{2nx+1} for all natural numbers x. Until recently, labelings of the latter type were defined only for bipartite and almost-bipartite graphs. We introduce two new labelings for tripartite graphs and show that if a graph G with n edges admits either of these labelings, then there exists a cyclic G-decomposition of K_{2nx+1} for every positive integer x. We also report on classes of tripartite graphs that admit these labelings.

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