

## Decomposition of $K_{18n}$ into Isomorphic Unicyclic Tripartite 9-Edge Graphs

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An *H-decomposition* of a graph  $G$  is a collection of graphs  $H_1, H_2, \dots, H_m$ , all isomorphic to  $H$ , such that every edge of  $G$  belongs to exactly one  $H_i$  for  $1 \leq i \leq m$ . A *unicyclic graph* is a graph containing exactly one cycle, and a *k-cycle* is a cycle of length  $k$ .

The problem of *H-decompositions* of complete graphs into isomorphic  $H_i$  is largely solved for graphs  $H$  with up to eight edges. Thus, we show that for any connected graph  $H$  with nine edges and containing exactly one  $k$ -cycle where  $k \geq 3$  is odd, i.e.  $H$  is tripartite, the graph  $H$  decomposes  $K_{18n}$ .

The constructions are based on Rosa-type labelings, especially  $\rho$ -*tripartite* and *1-rotational*  $\rho$ -*tripartite* labelings.

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