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The Structure of Gamma Graphs

The gamma graph of a graph G has vertices labelled by the minimum dominating sets of G , and edges formed by joining all pairs of vertices whose associated minimum dominating sets differ in exactly one element. The central question is: which graphs occur as the gamma graph of some graph? We explicitly construct a graph having an arbitrary prescribed set of minimum dominating sets. This simplifies the central question by showing that a graph occurs as the gamma graph of some graph if and only if its vertices can be labelled by sets of equal size so that the adjacency condition for gamma graphs holds. Many of the major results on gamma graphs arise as straightforward corollaries, often with shorter and simpler proofs. We obtain several new results, including the classification of all gamma graphs on at most six vertices. This is joint work with Samuel Simon and Jonathan Jedwab.