

Limits and Periodicity of Metamour 2-Distance Graphs

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Given a finite simple graph G , let $M(G)$ denote its 2-distance graph, in which two vertices are adjacent if and only if they have distance 2 in G . In this paper, we consider the periodic behavior of the sequence $G, M(G), M^2(G), M^3(G), \dots$ obtained by iterating the 2-distance operation. In particular, we classify the connected graphs with period 3, and we partially characterize those with period 2. We then study two families of graphs whose 2-distance sequence is *eventually* periodic: namely, generalized Petersen graphs and complete m -ary trees. For each family, we show that the eventual period is 2, and we determine the pre-period and the two limit graphs of the sequence.

Keywords: 2-distance graphs, metamour graphs, metamour-complementary graphs, metamour period