On the Diameter of Generalized Petersen Graphs

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Generalized Petersen graphs are a well-studied family of graphs that frequently arise in the study of cubic graphs. Surprisingly, the diameter of a given Generalized Petersen graph $G(m, j)$ is only known in a few cases. For an exterior vertex v_k, we introduce the function, $E_k(a)$ and the winding number $w(k)$, to find minimal paths from v_0 to v_k, which aid in calculating the diameter of $G(m, j)$. After this, we classify the graphs $G(m, j)$ whose vertices have winding numbers in the set $\{0, -1\}$, and calculate the diameter for such graphs. This expands the number of graphs for which we can find the diameter, greatly simplifies the calculation, and provides a framework to solve the problem in general.

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