

# An Upper Bound on the Order of a Family of Edge-Regular Graphs

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## **Abstract**

We build on previous results concerning regular simple graphs in which there exists a  $\lambda > 0$  such that any two adjacent vertices have exactly  $\lambda$  common neighbors, and the union of their neighborhoods includes all but exactly  $\mu$  vertices. It has been determined that the maximum number of vertices on such a graph given such a  $\lambda$  and  $\mu$  is  $3\lambda + 3\mu$ , and that, the graphs containing this number of vertices are, for the most part, unique. In this talk, we examine graphs having the requirements above with order  $n < 3\lambda + 3\mu$ ; in particular, we characterize such graphs of order  $3\lambda + 3\mu - 2$ , where  $\mu$  is even, and whose common-neighbor sets of adjacent vertex-pairs induce a perfect matching. Time permitting, we will present results where  $\mu$  is odd.