The Maximum Rectilinear Crossing Number of the Complete Multipartite and Generalized Wheel Graphs

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We begin this work by providing a simple proof of the maximum rectilinear crossing number of the complete multipartite graph by analyzing 4-tuples of vertices. We then expand upon previous work on the maximum rectilinear crossing number of the wheel graph by proving an expression for the maximum rectilinear crossing number of the generalized wheel graph, $W_{n,m} := C_n + K_m$. Finally, we propose the twice generalized wheel graph and prove its maximum rectilinear crossing number using our results on the maximum rectilinear crossing number of the complete multipartite and wheel graphs. General remarks on the maximum rectilinear crossing number of graphs defined through the join operator (+) are also included.

Keywords: maximum rectilinear crossing number, complete multipartite graph, wheel graph, generalized wheel graph