Essential Edge Connectivity of Line Graphs

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Abstract

In 1969, Chartrand and Stewart proved a relation for the edge connectivity of a graph G and its line graph $L(G)$, written κ', that $\kappa'(L(G)) \geq 2\kappa'(G) - 2$ for a graph with $\delta(G) \geq 3$. We show a similar relation for the essential edge connectivity, written κ'_e, that $\kappa'_e(L(G)) \geq 2\kappa'_e(G) - 2$ for a graph with $\delta(G) \geq 3$. As a corollary, the similar relation for the vertex connectivity of the line graph $L(G)$ and the 2nd iterated line graph $L^2(G)$, written κ, that $\kappa(L^2(G)) \geq 2\kappa(L(G)) - 2$ for a graph with $\delta(G) \geq 3$. And the bounds are both sharp.