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Wiener index of iterated line graphs of trees homeomorphic to the claw $K_{1,3}$

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Abstract

Let G be a graph. Denote by $L^i(G)$ its i-iterated line graph and denote by $W(G)$ its Wiener index. Dobrynin, Entringer and Gutman stated the following problem: Does there exist a non-trivial tree T and $i \geq 3$ such that $W(L^i(T)) = W(T)$? In a series of five papers we solve this problem. In a previous paper we proved that $W(L^i(T)) > W(T)$ for every tree T that is not homeomorphic to a path, claw $K_{1,3}$ and to the graph of "letter H", where $i \geq 3$. Here we prove that $W(L^i(T)) > W(T)$ for every tree T homeomorphic to the claw, $T \neq K_{1,3}$ and $i \geq 4$.

Keywords: Wiener index, iterated line graph, tree, claw.

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Wienerjev indeks iteriranih linijskih grafov dreves, homeomorfnih $K_{1,3}$

Povzetek

Naj bo G graf. Ozančimo z $L^i(G)$ njegov i-ti iterirani linijski graf, z $W(G)$ pa njegov Wienerjev indeks. Dobrynin, Entringer in Gutman so izpostavili naslednji problem: Ali obstaja netrivialno drevo T, pri katerem za kakšen $i \geq 3$ velja $W(L^i(T)) = W(T)$? Rešitev problema predstavljamo v petih zaporednih člankih. V prejšnjem smo pokazali, da velja $W(L^i(T)) > W(T)$ za vsako drevo T, ki ni homeomorfno poti, grafu $K_{1,3}$ ali grafu v obliki "črke H", kjer je $i \geq 3$. Tu pokažemo, da velja $W(L^i(T)) > W(T)$, kjer je $i \geq 4$, za vsako drevo $T \neq K_{1,3}$, homeomorfno grafu $K_{1,3}$.

Ključne besede: Wienerjev indeks, iterirani linijski graf, drevo.