



## NEW APPROACH TO A CONJECTURE ON THE RANDIĆ INDEX OF TRIANGLE-FREE GRAPHS

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### Abstract

The Randić index  $R(G)$  of a graph  $G$  is defined by  $R(G) = \sum_{u,v} \frac{1}{\sqrt{d(u)d(v)}}$ ,

where  $d(u)$  is the degree of a vertex  $u$  in  $G$  and the summation extends over all edges  $uv$  of  $G$ . There is a conjecture in [X. Li and I. Gutman, Mathematical aspects of Randić-type molecular structure descriptors, Mathematical Chemistry Monographs, No. 1, University of Kragujevac, (2006), 330] stated as follows: Let  $G$  be a triangle-free graph of order  $n$  with  $\delta(G) \geq k \geq 1$ , then  $R(G) \geq \sqrt{k(n-k)}$ , where the equality holds if and only if  $G \cong K_{k,n-k}$ . Li and Liu [X. Li and J. Liu, Complete solution to a conjecture on the Randić index of triangle-free graphs, Disc. Math. 309 (2009), 6322-6324] solved the conjecture. In this work, we prove the conjecture using a nonlinear programming model.

**Keywords and phrases:** Randić index, conjecture, triangle-free.

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