

RANDIĆ INDEX AND RANDIĆ MATRIX: PROPERTIES AND SOME APPLICATIONS

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(JOINT WORK WITH ENIDE ANDRADE AND MARIA ROBBIANO)

The Randić index is a spectral invariant presented in 1975 by Milan Randić and with important applications in Chemistry, Pharmacology and Medicine namely, in the study of prediction of colon and breast cancer. In 2010 the Randić matrix was defined as a nonnegative matrix built from this index. The study of the spectrum of matrices associated with graphs is one of the major goals of research in graph theory and there are already several applications in different scientific areas. This work presents a study related to spectral invariants for the Randić matrix of a graph namely the Randić spread (new concept in literature) and in addition, upper and lower bounds are presented for this spectral invariant. In chemistry, the energy of caterpillar graphs, that are associated with aromatic systems, is related with the resonance of these systems. Having this as motivation, the spectrum and the Randić spectrum of caterpillar graphs are studied and upper bounds are presented for the energy and for the Randić energy of this class of graphs.

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