

PC-polynomial on graph and its largest root

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Given a graph G , we are interested on the properties of $\beta(G)$, the largest root of PC-polynomial, a polynomial with integer coefficients depending on the numbers of cliques in G . The number $\beta(G)$ is deeply related to partially commutative algebras, Lovász local lemma and matrices. We find a graph on which $\beta(G)$ reaches the largest value if the numbers $n = |V|$ and $k = |E|$ are fixed. We find the upper bound on $\beta(G)$: $\beta(G) < n - (0.941k)/n$ for $n \gg 1$. We obtain new versions of Lovász local lemma. We investigate the analogues of Nordhaus-Gaddum inequalities for $\beta(G)$. Applying random graphs, we prove that the average value of $\beta(G)$ on graphs with n vertices asymptotically equals $\approx 0.672n$.