Let G be a simple graph of order n. The spectral radius $\rho(G)$ of G is the largest eigenvalue of its adjacency matrix. For each positive integer ℓ at most n, this talk gives a sharp upper bound for $\rho(G)$ by a function of the first ℓ vertex degrees in G, which generalizes a series of previous results. Several applications of these bounds are then provided. The idea of the above result also applies to bipartite graphs. Let k, p, q be positive integers with $k < p < q + 1$. We prove a conjecture stating that the maximum spectral radius of a simple bipartite graph obtained from the complete bipartite graph $K_{p,q}$ of bipartition orders p and q by deleting k edges is attained when the deleted edges are all incident on a common vertex which is located in the partite set of order q. It is further used to prove that the graph obtained by deleting an edge from a complete bipartite graph is determined by its spectrum. Some graphs are also proposed, each of which is obtained from a complete bipartite graph by adding a vertex and an edge incident on the new vertex and an original vertex, which are not determined by their spectra.

KEYWORDS

Graph, bipartite graph, adjacency matrix, spectral radius, degree sequence, determined by the spectrum (DS).