Degree sequences of bipartite graphs

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Let m and n positive integers ($m \geq n$), $R = (r_1, \ldots, r_m)$ and $S = (s_1, \ldots, s_n)$ be two nonincreasing sequences of nonnegative integers with

$$r_1 + r_2 + \cdots r_m = s_1 + s_2 + \cdots s_n. \tag{1}$$

Among others the Gale-Ryser theorem [5, 9] answers the question when there exists a bipartite graph $B_{m,n}$ having degree sequences (R, S). Later Ford and Fulkerson [4], Brualdi [1, 2] Chen [3] and Krause [8] also published a proof.

Recently we have found a quick method to test degreee sequences of simple graphs and using the quick method we enumerated the degree sequences of simple graphs for new values of the number of vertices [6, 7]. In the talk we report on the extension of the new algorithm and on its application to enumerate the degree sequences of bipartite graphs $B_{m,n}$.

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