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Botanická 68a, 60200 Brno, Czech Rep. *Semicages and extremal problems for maximum genus.*

Maximum genus of a graph G is the largest integer g such that G has a cellular embedding into the orientable surface of genus g . It is widely known that the maximum genus of a given graph can be calculated through a min-max formula given by theorems of Xuong and Nebešký. With the aid of this characterisation, a significant effort was invested into determining the lowest possible maximum genus and finding the extremal graphs in particular graph classes, such as graphs with a given connectivity or girth. In this talk we present a new method for attacking this type of problems by relating the maximum genus with the existence of induced subgraphs with odd cycle rank separated from the rest of the graph by at most 3 edges. The bounds on the maximum genus are then obtained by counting the maximum number of such induced subgraphs in graphs with a fixed size which belongs to the class in consideration. We illustrate the technique by calculating the maximum genus of regular graphs, as well giving very simple proofs of several classical results in the area. One of the main advantages of our approach is that in many cases, the obtained bounds are tight. (Received September 17, 2013)