

Some recent results on Castelnuovo-Mumford regularity

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Let \mathbb{K} be a field and $S = \mathbb{K}[x_1, \dots, x_n]$ be the polynomial ring in n variables over \mathbb{K} . Suppose that M is a graded S -module with minimal free resolution

$$0 \longrightarrow \cdots \longrightarrow \bigoplus_j S(-j)^{\beta_{1,j}(M)} \longrightarrow \bigoplus_j S(-j)^{\beta_{0,j}(M)} \longrightarrow M \longrightarrow 0.$$

The Castelnuovo–Mumford regularity (or simply, regularity) of M , denote by $\text{reg}(M)$, is defined as follows:

$$\text{reg}(M) = \max\{j - i \mid \beta_{i,j}(M) \neq 0\}.$$

We survey a number of recent studies of the Castelnuovo-Mumford regularity of the ideals related to a graph. our focus is on the bounds and exact values for the regularity in terms of combinatorial data from associated graphs.