

Betti numbers and flat dimensions of local cohomology modules

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Abstract. Assume that R is a commutative Noetherian ring with non-zero identity, \mathfrak{a} is an ideal of R and X is an R -module. In this paper, we first study the finiteness of Betti numbers of local cohomology modules $H_{\mathfrak{a}}^i(X)$. Then we give some inequalities between the Betti numbers of X and those of its local cohomology modules. Finally, we present many upper bounds for the flat dimension of X in terms of the flat dimensions of its local cohomology modules and an upper bound for the flat dimension of $H_{\mathfrak{a}}^i(X)$ in terms of the flat dimensions of the modules $H_{\mathfrak{a}}^j(X)$, $j \neq i$, and that of X .