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Some results on the finiteness properties of local cohomology modules

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Abstract

Let (R, \mathfrak{m}) be a commutative Noetherian local ring with identity and I be an ideal of R . Assume that M is a nonzero minimax R -module such that $\dim \text{Supp } H_I^i(M) \leq 1$ for all i . It is shown that the R -module $H_I^i(M)$ is I -cominimax for all i . In fact, $H_I^i(M)$ is I -cofinite for all $i \geq 2$. This immediately implies that if I has dimension one (i.e., $\dim R/I = 1$), then $H_I^i(M)$ is I -cominimax for all $i \geq 0$ and so the set of associated primes of $H_I^i(M)$ is finite for all $i \geq 0$. Also, we prove that if $\dim \text{Supp } H_I^i(M) \leq 2$ for all i , then $\text{Ext}_R^j(R/I, H_I^i(M))$ is weakly Laskerian for all $i, j \geq 0$. As a consequence, it follows that the set of associated primes of $H_I^i(M)$ is finite for all $i \geq 0$, whenever $\dim R/I \leq 2$.

Joint work: A. Abbasi, D. Hassanzadeh-lelekaami.