

## ON THE ASSOCIATED PRIME IDEALS OF LOCAL COHOMOLOGY MODULES DEFINED BY A PAIR OF IDEALS

MARYAM JAHANGIRI<sup>1</sup>

*Faculty of Mathematical Sciences and Computer  
Kharazmi University, Tehran, Iran  
and*

*School of Mathematics  
Institute for Research in Fundamental Sciences (IPM)  
P.O. Box 19395-5746, Tehran, Iran*

**e-mail:** mjahangiri@ipm.ir  
jahangiri.maryam@gmail.com

ZOHREH HABIBI AND KHADIJEH AHMADI AMOLI

*Payame Noor University  
P.O. Box 19395-3697, Tehran, Iran*

**e-mail:** z.habibi@pnu.ac.ir  
khahmadi@pnu.ac.ir

### Abstract

Let  $I$  and  $J$  be two ideals of a commutative Noetherian ring  $R$  and  $M$  be an  $R$ -module. For a non-negative integer  $n$  it is shown that, if the sets  $\text{Ass}_R(\text{Ext}_R^n(R/I, M))$  and  $\text{Supp}_R(\text{Ext}_R^i(R/I, H_{I,J}^j(M)))$  are finite for all  $i \leq n + 1$  and all  $j < n$ , then so is  $\text{Ass}_R(\text{Hom}_R(R/I, H_{I,J}^n(M)))$ . We also study the finiteness of  $\text{Ass}_R(\text{Ext}_R^i(R/I, H_{I,J}^n(M)))$  for  $i = 1, 2$ .

**Keywords:** local cohomology modules defined by a pair of ideals, spectral sequences, associated prime ideals.

**2010 Mathematics Subject Classification:** Primary 13D45; Secondary 13E05, 13E10.

### REFERENCES

- [1] M. Aghapournahr, Kh. Ahmadi-Amoli and M.Y. Sadeghi, *The concept of  $(I, J)$ -cohen Macaulay modules*, J. Algebraic Syst. **3** (1) (2015) 1–10.

---

<sup>1</sup>Corresponding author.

- [2] N. Bourbaki, *Commutative Algebra*, Translated from French (Hermann, Paris, 1972).
- [3] M. Brodmann, *Asymptotic behaviour of cohomology: tameness, supports and associated primes*, S. Ghorpade, H. Srinivasan, J. Verma (Eds.), "Commutative Algebra and Algebraic Geometry" Proceedings, Joint International Meeting of the AMS and the IMS on Commutative Algebra and Algebraic Geometry, Bangalore/India, December 17–20, 2003, *Contemporary Mathematics* **390** (2005) 31–61. doi:10.1090/conm/390/07292
- [4] M.P. Brodmann and A. Lashgari Faghani, *A finiteness result for associated primes of local cohomology modules*, *Proc. Amer. Math. Soc.* **128** (10) (2000) 2851–2853. doi:10.1090/S0002-9939-00-05328-4
- [5] M.P. Brodmann and R.Y. Sharp, *Local cohomology: An algebraic introduction with geometric applications* (Cambridge University Press, 1998). doi:10.1017/CBO9780511629204
- [6] W. Bruns and J. Herzog, *Cohen-Macaulay Rings* (Cambridge University Press, revised ed., 1998). doi:10.1017/CBO9780511608681
- [7] L. Chu, *Top local cohomology modules with respect to a pair of ideals*, *Proc. Amer. Math. Soc.* **139** (2011) 777–782. doi:10.1090/S0002-9939-2010-10471-9
- [8] L. Chu and Q. Wang, *Some results on local cohomology modules defined by a pair of ideals*, *J. Math. Kyoto Univ.* **49** (2009) 193–200.
- [9] R. Hartshorne, *Affine duality and cofiniteness*, *Invent. Math.* **9** (1970) 145–164. doi:10.1007/BF01404554
- [10] C. Huneke, *Free resolutions in commutative algebra and algebraic geometry*, *Res. Notes Math.* 2, Jones and Bartlett (Boston, MA, 1992) 93–108.
- [11] J. Rotman, *An Introduction to Homological Algebra* (Academic Press, Second Edition, 2009). doi:10.1007/b98977
- [12] P. Schenzel, *Explicit computations around the Lichtenbaum-Hartshorne vanishing theorem*, *Manuscripta Math.* **78** (1) (1993) 57–68. doi:10.1007/BF02599300
- [13] A. Singh, *P-torsion elements in local cohomology modules*, (English summary) *Math. Res. Lett.* **7** (2000) 165–176. doi:10.4310/MRL.2000.v7.n2.a3
- [14] R. Takahashi, Y. Yoshino and T. Yoshizawa, *Local cohomology based on a nonclosed support defined by a pair of ideals*, *J. Pure Appl. Algebra.* **213** (2009) 582–600. doi:10.1016/j.jpaa.2008.09.008
- [15] A. Tehranian and A. Pour Eshmanan Talemi, *Cofinitness of local cohomology based on a non-closed support defined by a pair of ideals*, *Bull. Iranian Math. Soc.* **36** (2) (2010) 145–155.

Received 14 June 2015  
Revised 30 November 2015