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CANONICAL ELEMENT CONJECTURE AND COHEN-MACAULAY RINGS

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Abstract: Let M be a module over a commutative Noetherian ring A and J be an ideal of A. In this short note, it is proved, by an elementary argument, that if $x_1, ..., x_n$ is an M-sequence contained in J, then $Hom_A(A/J, H^n_J(M)) \cong (x_1, ..., x_n)M :_M J/(x_1, ..., x_n)M$. As an application of this result, the canonical element conjecture is established in a certain case.

Keywords and Phrases: Cohen-Macaulay ring, Canonical Element Conjecture, local cohomology, maximal Cohen-Macaulay module.

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1. Introduction

Throughout this short note A is a commutative Noetherian ring. For an A-module M and a sequence $x_1, ..., x_n$ of element of A, we say that $x_1, ..., x_n$ is an M-sequence if $(x_1, ..., x_n)M \neq M$ and x_i is a non-zero divisor on $M/(x_1, ..., x_{i-1})M$ for all $i = 1, ..., n$. Also, for an ideal I of A, we use notation $H^t_I(M)$ to denote the t-th local cohomology module of M with support in I. Finally, for ideals I and J of A, the submodule $\{\alpha \in H^t_I(M) : J\alpha = 0\}$ of $H^t_I(M)$ is denoted by $Ann_{H^t_I(M)}(J)$. Note that $Ann_{H^t_I(M)}(J) \cong Hom_A(A/J, H^t_I(M))$. Let J be an ideal of A and Let $x_1, ..., x_n$