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W. Frank Moore*, Department of Mathematics, Malott Hall, Ithaca, NY 14853-, **Gregory Peipmeyer** (peipmeyer@missouri.edu), Department of Mathematics, Columbia, MO 65211, **Sandra Spiroff** (spiroff@olemiss.edu), Department of Mathematics, University, MS 38677, and **Mark E. Walker** (mwalker5@math.unl.edu), Department of Mathematics, Avery Hall, Lincoln, NE 68588. *On Hochster's Theta function.*

Let R be an isolated hypersurface singularity, and let M and N be finitely generated R -modules. As R is a hypersurface, the torsion modules of M against N are eventually periodic of period two (i.e., $\text{Tor}_i^R(M, N) \cong \text{Tor}_{i+2}^R(M, N)$ for $i \gg 0$). Since R is an isolated singularity, these torsion modules are of finite length for i large enough. The theta invariant of the pair (M, N) is defined by Hochster to be

$$\theta(M, N) = \ell(\text{Tor}_{2i}^R(M, N)) - \ell(\text{Tor}_{2i+1}^R(M, N)) \quad \text{for } i \gg 0.$$

H. Dao has conjectured that the theta invariant is zero for all pairs (M, N) when R has even dimension and contains a field. This paper proves this conjecture under the additional assumption that R is graded with its irrelevant maximal ideal giving the isolated singularity. We also give a careful analysis of the theta pairing when the dimension of R is even, and relate it to a classical pairing on the smooth variety $\text{Proj}(R)$. (Received September 08, 2009)