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W. Frank Moore, Greg Piepmeyer, Mark E. Walker and Sandra Spiroff*
(spiroff@olemiss.edu), Department of Mathematics, University of Mississippi, Hume Hall 305,
University, MS 38677-1848. *Hochster's Theta Function and the Hodge-Riemann Bilinear
Relations*. Preliminary report.

In 1981, M. Hochster introduced the *theta* function on a pair of finitely generated modules M and N , over a local hypersurface R , such that the lengths $\ell(\mathrm{Tor}_i^R(M, N))$ are finite for large enough i . By definition,

$$\theta^R(M, N) = \ell(\mathrm{Tor}_{2i+2}^R(M, N)) - \ell(\mathrm{Tor}_{2i+1}^R(M, N)),$$

for i sufficiently large. In 2006, H. Dao conjectured that *theta* vanishes for all finitely generated R -modules M and N when R is an isolated hypersurface singularity of even dimension and contains a field. We prove this conjecture under the additional assumption that R is graded with its irrelevant maximal ideal giving the isolated singularity. Furthermore, we describe the obstruction to vanishing in odd dimensions. This is joint work with Mark E. Walker, Greg Piepmeyer, and Frank Moore. (Received July 29, 2009)