

Title: Bounds on depth of tensor products of modules

Abstract:

Let R be a local complete intersection ring and let M and N be nonzero finitely generated R -modules. We study the vanishing of Tor and obtain useful bounds for the depth of the tensor product $M \otimes_R N$.

An application of our main argument shows that, if M is locally free on the punctured spectrum of R , then either $\text{depth}(M \otimes_R N) \geq \text{depth}(M) + \text{depth}(N) - \text{depth}(R)$, or $\text{depth}(M \otimes_R N) \leq \text{codim}(R)$.

Along the way we generalize an important theorem of D.A. Jorgensen and determine the number of consecutive vanishing of $\text{Tor}_i(M, N)$ required to ensure the vanishing of all higher $\text{Tor}_i(M, N)$.

This is a joint work with O. Celikbas and R. Takahashi.