

Boğaziçi MATH COLLOQUIUM

Vanishing of Tor, and depth properties of tensor products of modules

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Abstract: The torsion functors $\text{Tor}_i^R(-, -)$, originally invented by topologists, have become an important tool and a subject of research in commutative algebra.

Given finitely generated nonzero modules M and N over a commutative Noetherian local ring R , the tensor product $M \otimes_R N$ of M and N typically has nonzero torsion. For example, if R is the ring of formal power series $\mathbb{C}[[X, Y]]$ in indeterminates X and Y , and I is the ideal of R generated by X and Y , then $I \otimes_R I$ has nonzero torsion.

The assumption that the tensor product $M \otimes_R N$ is torsion-free influences the structure and vanishing of the modules $\text{Tor}_i^R(M, N)$. In turn, the vanishing of $\text{Tor}_i^R(M, N)$ imposes certain restrictions on the properties of M and N . These connections made their first appearance in Auslander's 1961 seminal paper "Modules over unramified regular local rings".

In this talk I will survey the literature on these topics with emphasis on recent progress. I will also state and discuss several open questions in this direction. The talk is aimed at graduate students.

Date : Wednesday, January 14, 2015

Time: 2pm

Place: TB 250, Boğaziçi University