The Lie module structure on the Hochschild cohomology groups of monomial algebras of radical square zero

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Let $HH^n(A)$ be the n^{th} Hochschild cohomology group of A with coeffcients in the bimodule A. It is well known that the first Hochschild cohomology group is a Lie algebra. Moreover, the Gerstenhaber bracket

$$[-,-] : HH^n(A) \times HH^m(A) \to HH^{n+m-2}(A)$$

provides a graded Lie algebra structure on the Hochschild cohomology. Therefore, a Lie module structure on the Hochschild cohomology groups is induced. In this talk, I will present some results concerning such Lie module structure when A is a finite-dimensional monomial algebra of radical square zero. First, we will describe the Lie algebra structure on $HH^1(A)$. Then we will study the Lie module structure on $HH^n(A)$ using a combinatorial description of both the Hochschild cohomology groups and the Gerstenhaber bracket. I will take as an example the multi-loops quiver in order to describe the Lie module structure using the irreducible modules over $\mathfrak{sl}_n(C)$.