DG polynomial algebras and their homological properties

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In [1], we introduce and study differential graded (DG for short) polynomial algebras. In brief, a DG polynomial algebra $\mathcal{A}$ is a connected cochain DG algebra such that its underlying graded algebra $\mathcal{A}^{\#}$ is a polynomial algebra $k[x_1, x_2, \cdots, x_n]$ with $|x_i| = 1$, for any $i \in \{1, 2, \cdots, n\}$.

We describe all possible differential structures on DG polynomial algebras; compute their DG automorphism groups; study their isomorphism problems; and show that they are all homologically smooth and Gorestein DG algebras. Furthermore, it is proved that the DG polynomial algebra $\mathcal{A}$ is a Calabi-Yau DG algebra when its differential $\partial_{\mathcal{A}} \neq 0$ and the trivial DG polynomial algebra $(\mathcal{A}, 0)$ is Calabi-Yau if and only if n is an odd integer.

Beside these, I will also present our most recent works [2] on the various invariants of DG polynomial algebras.

REFERENCES

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2. X.-F. Mao and M.-Y. Zhang, A note on invariants of DG polynomial algebras, (submitted to Archiv der Mathematik) https://arxiv.org/abs/1902.03762