Department of Mathematics and Statistics Colloquium

Homological Dimensions in Commutative Algebra

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Abstract: Commutative algebra is the study of commutative rings and other abstract structures based on commutative rings. Modules can be viewed as a common generalization of several of those structures, and some invariants, e.g. homological dimensions, of modules are used to characterize certain properties of the base ring. We will explore this theme of "to study a ring, study its modules" in the context of Holm and Jorgensen's investigation [4] into some connections between C-Gorenstein dimensions of an R-complex and Gorenstein dimensions of the same complex viewed as a complex over the "trivial extension" $R \times C$. We will discuss a generalization [1] of their results to a certain type of retract diagram, and present some examples of such retract diagrams, namely D'Anna and Fontana's amalgamated duplication [2] and Enescu's pseudocanonical cover [3]. We will end with a partial result from the most recent investigation of such examples in an undergraduate research setting.

References

[1] Pye Phyo Aung. Gorenstein dimensions over some rings of the form $R \oplus C$. *J. Algebra Appl.*, 15(3):1650043, 19, 2016.

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[4] Henrik Holm and Peter Jorgensen. Semi-dualizing modules and related Gorenstein homological dimensions. *J. Pure Appl. Algebra*, 205(2):423 - 445, 2006.

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