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Homological methods in the representation theory of partially ordered sets

One of the methods in the theory of modules over finite dimensional algebras consists in reducing, in some sense, a problem about modules to a problem of linear algebra. Although such a reduction is not always fruitful, the method has had many applications, which have identified several important classes of problems of linear algebra. One of these classes, representations of partially ordered sets, admits certain combinatorial procedures that replace the given partially ordered set with a new one, having almost the same representations. Although the procedures, called differentiation algorithms, are crucial for applications to module theory, proving that the algorithms work involves rather cumbersome computations that treat the algorithms as ad hoc constructions and give no indication of their relationship to conceptual mathematics. The purpose of this talk is to interpret differentiation algorithms using classical methods of homological algebra.