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Incidence algebras and their representations.

We give a unified approach via incidence algebras to several types of representations present in literature: distributive, square-free, with finitely many orbits, or with finitely many invariant subspaces. We introduce deformations of incidence algebras of posets, classify them and their square-free representations in terms of cohomology of the simplicial realization of the poset. We find several equivalent characterizations of deformations and of incidence algebras, such as that deformations are precisely the locally hereditary semidistributive algebras, and incidence algebras are algebras with a faithful square-free representation or equivalently acyclic algebras with a faithful distributive module. As a consequence, we show that any distributive acyclic representation of a finite dimensional algebra can be presented as the defining representation of an incidence algebra. Time permitting, we present a few other applications: we rederive several results in the literature of incidence algebras as well classify generic distributive or square-free representations in the acyclic case, and give consequences on representation and Grothendieck rings of incidence algebras and on a conjecture of Bongartz and Ringel. (Received July 19, 2016)