Abstract

Many enumerative problems can be restated as questions about walks on the cover relations of a partially ordered set. Differential posets are a class of posets in which one can solve the walk-enumeration problem explicitly. The technique relies on the use of linear operators U and D, defined on the formal span of a poset $\mathcal{P}$, which satisfy the commutation relation $DU - UD = rI$ for some constant r. By making weaker assumptions about U and D, the linear algebraic techniques used to enumerate walks on differential posets can be applied in a more general context. This thesis is a uniform presentation of the work done in this area, mainly due to Stanley and Fomin. It also includes new proofs or minor generalizations of some results, a new example of a generalized differential poset, and a proof of a "folklore theorem" about taking quotients of generalized differential posets modulo a group action.