

DOCTORAL THESIS

Quasisymmetric Functions in Partially Commuting Variables Under Hivert's Local Action

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Abstract

In this thesis we connect the theory of the Hopf algebra of r -quasisymmetric functions (denoted QSym^r), a one parameter Hopf algebra that generalizes the Hopf algebra of symmetric functions and the Hopf algebra of quasisymmetric functions, to QSym^r 's noncommutative analog r -quasisymmetric functions in noncommutative functions denoted NCQSym^r . This is accomplished by defining a powersum basis for QSym^r and NCQSym^r and a one parameter equivalence relation on r -set compositions, that is a generalization of partitions and compositions, denoted as s -equivalence. Then we quotient NCQSym^r by the equivalence of powersum functions indexed by s -equivalent r -set compositions. This quotient space is a Hopf algebra, and when $s = \infty$ the quotient space is QSym^r .