Bogfjellmo, Geir; Dahmen, Rafael; Schmeding, Alexander


Summary: In this article character groups of Hopf algebras are studied from the perspective of infinite-dimensional Lie theory. For a graded and connected Hopf algebra we obtain an infinite-dimensional Lie group structure on the character group with values in a locally convex algebra. This structure turns the character group into a Baker-Campbell-Hausdorff-Lie group which is regular in the sense of Milnor. Furthermore, we show that certain subgroups associated to Hopf ideals become closed Lie subgroups of the character group.

If the Hopf algebra is not graded, its character group will in general not be a Lie group. However, we show that for any Hopf algebra the character group with values in a weakly complete algebra is a pro-Lie group in the sense of Hofmann and Morris.

MSC:
22E65 Infinite-dimensional Lie groups and their Lie algebras: general properties
16T05 Hopf algebras and their applications
43A40 Character groups and dual objects
58B25 Group structures and generalizations on infinite-dimensional manifolds
46H30 Functional calculus in topological algebras
22A05 Structure of general topological groups

Keywords:
real analytic; infinite-dimensional Lie group; Hopf algebra; continuous inverse algebra; Butcher group; weakly complete space; pro-Lie group

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