

Abstract

Symmetric categories have been of great interest in quantum algebra and mathematical physics. Cohen and Westreich in 1998 studied symmetries in the Yetter-Drinfel'd category over a Hopf algebra under some conditions. Pareigis in 2001 found the necessary and sufficient condition for ${}^H_H YD$ to be symmetric. Later, Panaite et al. in 2010 proposed the definition of pseudosymmetric braided categories which can be viewed as a kind of weakened symmetric braided categories, and showed that the category ${}^H_H YD$ is pseudosymmetric if and only if H is commutative and cocommutative. Let H be a Hopf algebra and $\mathcal{LR}(H)$ the category of Yetter-Drinfel'd-Long bimodules over H . We first show that the Yetter-Drinfel'd-Long category $\mathcal{LR}(H)$ is symmetric if and only if H is trivial in four different methods, and that $\mathcal{LR}(H)$ is pseudosymmetric if and only if H is commutative and cocommutative. We then introduce the definition of the \mathfrak{u} -condition in $\mathcal{LR}(H)$ and give a necessary and sufficient condition for H_i ($i = 1, 2, 3, 4$) to satisfy the \mathfrak{u} -condition. Then we study the relation between the \mathfrak{u} -condition and the symmetry of $\mathcal{LR}(H)$.