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Simple current auto-equivalences of modular tensor categories. (English) Zbl 07176130

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A symmetry of a modular tensor category is represented by a monoidal auto-equivalence, either braided or just plain monoidal, which is an significant element in various constructions concerning modular tensor categories, braided auto-equivalences particularly playing a crucial role in the classification of *quantum subgroups* of modular tensor categories and being the starting point in application of the process of gauging [*S. X. Cui* et al., Commun. Math. Phys. 348, No. 3, 1043–1064 (2016; Zbl 06666268)]. A process known as *simple current automorphisms* [*D. Bernard*, "String characters from Kac-Moody automorphisms", Nuclear Phys. B 288, No. 3–4, 628–648 (1987); *T. Gannon*, Adv. Math. 165, No. 2, 165–193 (2002; Zbl 1053.17017); *A. N. Schellekens*, "Fusion rule automorphisms from integer spin simple currents", Phys. Lett. B 244, No. 2, 255–260 (1990)] takes an invertible object in a modular tensor category, producing an automorphism of the fusion ring of that category in turn. It is not true in general that every fusion ring automorphism lifts to a monoidal auto-equivalence, and therefore there is no guarantee that simple current automorphisms lift to monoidal auto-equivalences [Theorem 9.3, *C. Edie-Michell*, "Equivalences of graded categories", Preprint, arXiv:1711.00645].

This paper constructs monoidal structure maps for simple current automorphisms, showing that these structure maps abide by the hexagon identity, which means that simple current automorphisms always lift to monoidal auto-equivalences. Necessary and sufficient conditions for these simple current automorphisms to be either braided or pivotal are also given.

Reviewer: Hirokazu Nishimura (Tsukuba)

MSC:

18M05 Monoidal categories, symmetric monoidal categories
81T40 Two-dimensional field theories, conformal field theories, etc. in quantum mechanics

Keywords:

modular tensor categories; monoidal auto-equivalences; quantum algebra

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