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Spherical DG-functors. (English) Zbl 1374.14015

The paper under review generalises the notion of a spherical object from [P. Seidel and R. Thomas, Duke Math. Journal, 108, 37–108 (2001, Zbl 1092.14025)] to that of a spherical functor between differential graded categories. This reduces to the original definition by considering the inclusion functor of the spherical object. The usefulness of spherical objects (and functors) is in constructing new auto-equivalences: the twist and cotwist, obtained as the cone of the (co-unit transformation, which in turn relate the left and right adjoints of the spherical functor to each other.

The paper has two main results. The first is a 2-out-of-4 property for the axioms of a spherical functor. The second is a criterion that checks when for a set of spherical functors the associated twists satisfy the braid relations.

The setting of the paper is that of dg categories and Morita quasi-functors, which is required for the more general notion of spherical functors (as opposed to spherical objects) because the axioms of triangulated categories are too weak to prove the required results. Great care is given to introducing the necessary constructions from the literature, making sure all conventions are consistent. Moreover a generalisation of the notion of twisted complexes is introduced, under the name of twisted cubes, as a higher octahedral axiom for pretriangulated categories. This is one of the main technical tools for the proofs.

Reviewer: Pieter Belmans (Bonn)

MSC:
14F05 Sheaves, derived categories of sheaves, etc. (MSC2010)
18D20 Enriched categories (over closed or monoidal categories)
18E30 Derived categories, triangulated categories (MSC2010)
18G99 Homological algebra in category theory, derived categories and functors

Keywords:
derived categories; DG-categories; autoequivalences; Fourier-Mukai transforms; spherical functors; braid group actions

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References:


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