Journal of Algebra 467 (2016) 1–46

Contents lists available at ScienceDirect

Journal of Algebra

www.elsevier.com/locate/jalgebra

Morphisms between indecomposable complexes in the bounded derived category of a gentle algebra

Kristin Krogh Arnesen [a], Rosanna Laking [b,*], David Pauksztello [b,*]

[a] *Faculty of Teacher and Interpreter Education, Norwegian University of Science and Technology (NTNU), N-7491 Trondheim, Norway*
[b] *School of Mathematics, The University of Manchester, Oxford Road, Manchester, M13 9PL, United Kingdom*

A R T I C L E   I N F O

Article history:
Received 20 February 2015
Available online 4 August 2016
Communicated by Michel Van den Bergh

MSC:
18E30
16G10
05E10

Keywords:
Bounded derived category
Gentle algebra
Homotopy string and band
String combinatorics
Morphism

A B S T R A C T

In this article we provide a simple combinatorial description of morphisms between indecomposable complexes in the bounded derived category of a gentle algebra.

* Corresponding authors.
E-mail addresses: kristin.arnesen@ntnu.no (K.K. Arnesen), rosanna.laking@manchester.ac.uk (R. Laking), david.pauksztello@manchester.ac.uk (D. Pauksztello).

http://dx.doi.org/10.1016/j.jalgebra.2016.07.019

Contents

Introduction

Triangulated categories are of central importance in many branches of mathematics, providing a common framework for algebraists, geometers, topologists and theoretical physicists, amongst others. Perhaps the most famous illustration of their utility is Beilinson's equivalences between the derived categories of coherent sheaves on projective spaces and representations of certain finite-dimensional algebras [7], which provided deep connections between algebra and geometry.

In algebra and geometry, the triangulated categories we have in mind are derived categories and categories constructed from them, for example, cluster categories. However, despite their utility, there is a major drawback: the construction of derived categories is abstract and explicit computation is often difficult. Indeed, much intuition is often obtained from examples of homological dimension one (= hereditary), owing to particularly nice homological properties which allow one to reduce computations to the (well-understood) abelian categories with which one starts.

Developing intuition in such an abstract setting requires a good collection of examples, for which computation becomes straightforward and non-trivial phenomena can be