

# Obstruction theory for algebras over an operad

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*(Submitted on 1 Nov 2010)*

The goal of this paper is to set up an obstruction theory in the context of algebras over an operad and in the framework of differential graded modules over a field. Precisely, the problem we consider is the following: Suppose given two algebras  $A$  and  $B$  over an operad  $P$  and an algebra morphism from the homology of  $A$  to the homology of  $B$ . Can we realize this morphism as a morphism of  $P$ -algebras from  $A$  to  $B$  in the homotopy category? Also, if the realization exists, is it unique in the homotopy category? We identify obstruction cocycles for this problem, and notice that they live in the first two groups of operadic Gamma-cohomology.

Comments: 21 pages

Subjects: **Algebraic Topology (math.AT)**

MSC classes: 55S35 (Primary) 18D50, 55P48 (Secondary)

Cite as: [arXiv:1011.0265v1](#) [math.AT]

## Submission history

From: Eric Hoffbeck [[view email](#)]

[v1] Mon, 1 Nov 2010 08:05:01 GMT (16kb)

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