



Abelianizations of derivation Lie algebras of the free associative algebra and the free Lie algebra

Shigeyuki Morita, Takuya Sakasai, Masaaki Suzuki

(Submitted on 19 Jul 2011 (v1), last revised 5 Jan 2013 (this version, v2))

We determine the abelianizations of the following three kinds of graded Lie algebras in certain stable ranges: derivations of the free associative algebra, derivations of the free Lie algebra and symplectic derivations of the free associative algebra. In each case, we consider both the whole derivation Lie algebra and its ideal consisting of derivations with positive degrees. As an application of the last case, and by making use of a theorem of Kontsevich, we obtain a new proof of the vanishing theorem of Harer concerning the top rational cohomology group of the mapping class group with respect to its virtual cohomological dimension.

Comments: 30 pages, 18 figures. Title modified, final version, to appear in Duke Math. J

Subjects: **Algebraic Topology (math.AT)**; Algebraic Geometry (math.AG); Geometric Topology (math.GT); Quantum Algebra (math.QA)

MSC classes: 17B56, 32G15, 55R40, 17B65, 20J06

Cite as: **arXiv:1107.3686 [math.AT]**
(or **arXiv:1107.3686v2 [math.AT]** for this version)

Submission history

From: Takuya Sakasai [[view email](#)]

[v1] Tue, 19 Jul 2011 11:16:18 GMT (287kb)

[v2] Sat, 5 Jan 2013 02:48:51 GMT (298kb)

Which authors of this paper are endorsers?

Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

math.AT

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1107](#)

Change to browse by:

[math](#)

[math.AG](#)

[math.GT](#)

[math.QA](#)

References & Citations

- [NASA ADS](#)

[1 blog link](#) (what is this?)

[Bookmark](#) (what is this?)

