

Cohomology of tensor products

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Many Lie algebras appearing in physics can be represented as the tensor product of two (generally, nonassociative) algebras subject to some "twisted" multiplication. Examples include "Poisson brackets of hydrodynamic type" (Novikov et al.), "Lie algebras generated by dynamical systems" (Vershik et al.), Lie algebras of symmetries of certain differential equations, etc. We will present a unified approach to compute cohomology of such Lie algebras, based on a certain spectral sequence formulated in terms of the Young graph, and allowing to express the cohomology in question in terms of certain invariants of tensor factors. Intuitively, this approach somewhat resembles separation of variables in differential equations: it works rarely, but when it works, it works extremely well. What makes this approach work or fail for that or another class of algebras, remains a bit of mystery.