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Zongzhu Lin* (zlin@math.ksu.edu), Department of Mathematics, 138 Cardwell Hall, 1228 N. 17th St., Manhattan, KS 66506. *Smooth representations of graded algebras*. Preliminary report.

A \mathbb{Z} -graded algebra $A = \bigoplus_n A_n$ has a natural filtration $\bigoplus_{i \leq p} A_p$ generates a filtration of left ideals $(F^p A)_n = \sum_{i \leq p} A_{n-i} A_i$, which defines a Hausdorff linear topology on A . Then we consider the completion as well as the smooth representations of A with respect to this topology (in the sense of representations of p -adic groups). One of the motivating examples is the construction of the universal enveloping algebras of a vertex algebra where the operator product in general are not defined in algebraic sense, but can make sense in the topological sense. The smooth representations of the universal enveloping algebras of vertex algebras are exactly the weak modules vertex algebras. Using this construction, the induction functors of vertex algebras can be easily constructed with tools available from representations of algebras. The \mathbb{Z} -gradation can also be replaced by \mathbb{Z}^n -gradation or any partially ordered abelian group. With a suitable choice of filtration, the category \mathcal{O} or the parabolic category \mathcal{O} for general Kac-Moody Lie algebras as well as their quantum analogue is exactly the category of smooth representations. (Received January 28, 2019)