

Non-abelian homology of Lie algebras with coefficients in Lie algebras is constructed and studied, generalising the classical Chevalley-Eilenberg homology of Lie algebras. The relation of cyclic homology with Milnor cyclic homology of non-commutative associative algebras is established in terms of the long exact non-abelian homology sequence of Lie algebras. Some explicit formulas for the second and the third non-abelian homology of Lie algebras are obtained. Using the generalised notion of the Lie algebra of derivations, we introduce the second non-abelian cohomology of Lie algebras with coefficients in crossed modules and extend the seven-term exact non-abelian cohomology sequence of Guin to nine-term exact sequence.