

SCMS Seminar

LOCAL AND 2-LOCAL DERIVATIONS AND AUTOMORPHISMS OF OCTONION ALGEBRAS

Speaker: Sh.A. Ayupov
V.I. Romanovskiy Institute of Mathematics, Uzbekistan
Academy of Sciences

Time: Fri, Oct. 23, 9:30-10:30

Venue: Gu Lecture Hall, SCMS

Abstract: The talk is devoted to a survey of results concerning the description of local and 2-local derivations (respectively, automorphisms) on some non-associative algebras. Special attention is given to the case of Octonion algebras. We shall give a general form of local derivations on the octonion algebra $O(F)$ over a field F with zero characteristic. This description implies that the space of all local derivations on $O(F)$, when equipped with the Lie bracket, is isomorphic to the Lie algebra $so_7(F)$ of all real skew-symmetric 7×7 matrices over F . At the same time, the Lie algebra of all derivations is isomorphic to the Lie algebra $g_2(F)$. It follows that the octonion algebra $O(F)$ over the field F is a simple non-associative algebra which admits pure local derivations, that is, local derivations which are not derivations. Further, we consider 2-local derivations on the octonion algebra $O(F)$ over an algebraically closed field F and prove that every 2-local derivation on $O(F)$ is a derivation. However, for the field R of real numbers, 2-local derivations on the octonion algebra $O(R)$ form a Lie algebra which is essentially larger than the Lie algebra $g_2(R)$ of derivations. We also present a general form of local automorphisms on the octonion algebra $O(F)$. This description implies that the group of all local automorphisms on $O(F)$ is isomorphic to the group $O_7(F)$ of all orthogonal 7×7 matrices over F , and is essentially larger than the group of all automorphisms. We also consider 2-local automorphisms on the octonion algebra $O(F)$ over an algebraically closed field F and prove that every 2-local automorphism on $O(F)$ is an automorphism. At the same time, the group of 2-local automorphisms of $O(R)$ is larger than the group of automorphisms of $O(R)$.