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Product Zero Derivations of the Parabolic Subalgebras of Simple Lie Algebras

Let \mathfrak{g} be a simple Lie algebra of rank l over an algebraic closed field of characteristic zero, \mathfrak{b} a Borel subalgebra of \mathfrak{g} , \mathfrak{p} a parabolic subalgebra of \mathfrak{g} containing \mathfrak{b} . A linear map φ on \mathfrak{p} is called a product zero derivation if, for $x, y \in \mathfrak{p}$, $[x, y] = 0$ implies $[\varphi(x), y] + [x, \varphi(y)] = 0$. It is shown in this paper that a product zero derivation φ on \mathfrak{p} is just a sum of an inner derivation and a scalar multiplication map in case that $l \geq 2$.

Keywords: Simple Lie algebras, parabolic subalgebras, derivations of Lie algebras.

MSC: 17B20, 17B30, 17B40