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Generalized Higher Derivations are Sequences of Generalized Derivations

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Abstract. Let $\mathcal{A}$ and $\mathcal{B}$ be two algebras. In this paper we give a characterization of generalized higher derivations (Jordan generalized higher derivations) from $\mathcal{A}$ to $\mathcal{B}$ in terms of generalized derivations (Jordan generalized derivations) on $\mathcal{B}$ under some certain conditions.

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1 Introduction and Preliminaries

Let $\mathcal{A}$ and $\mathcal{B}$ be two algebras, $\mathcal{X}$ be a $\mathcal{B}$-bimodule and $\sigma : \mathcal{A} \to \mathcal{B}$ be a linear mapping. A linear mapping $\delta : \mathcal{A} \to \mathcal{X}$ is called a *σ-derivation* if it satisfies the Leibniz rule $\delta(ab) = \delta(a)\sigma(b) + \sigma(a)\delta(b)$ for all $a, b \in \mathcal{A}$. In the case $\mathcal{A} = \mathcal{B} = \mathcal{X}$ and $\sigma = I_{\mathcal{A}}$, the identity mapping on $\mathcal{A}$, a σ-derivation is called a *derivation*. For other approaches to generalized notions of derivations and their applications see [1, 2, 5, 11, 12] and references therein. A sequence $\{f_n\}_{n\in\mathbb{N}\cup\{0\}}$ of linear mappings from $\mathcal{A}$ to $\mathcal{B}$ is called a *higher derivation* if $f_n(ab) = \sum_{k=0}^{n} f_k(a)f_{n-k}(b)$ for each $a, b \in \mathcal{A}$ and each non-negative integer n. Higher derivations were introduced by Hasse and Schmidt [6], and algebraists sometimes call them Hasse-Schmidt derivations. For an account of higher derivations the reader is referred to the book [4].

In [10], the first named author gave a characterization of higher derivations from an algebra $\mathcal{A}$ into itself, in terms of derivations on $\mathcal{A}$, provided that f_0 is the identity

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