Editorial
Volume 16:3, 2022

Journal of
Generalized Lie Theory and Applications

ISSN: 1736-4337 Open Access

Lie Frameworks: Hypothesis and Applications

Ivan Shestakov*

Department of Mathematics and Statistics, University of São Paulo, Brazil

Editorial

A Lie framework is an arrangement of first-request customary differential conditions portraying the necessary bends of a t-subordinate vector field taking qualities in a limited layered genuine Lie variable based math of vector fields: a purported Vessiot-Guldberg Lie polynomial math. We propose the meaning of a specific class of Lie frameworks, the k-symplectic Lie frameworks, conceding a Vessiot-Guldberg Lie polynomial math of Hamiltonian vector fields as for the presymplectic types of a k-symplectic structure. We devise new k-symplectic mathematical strategies to concentrate on their superposition rules, t-autonomous constants of movement and general properties. Our outcomes are delineated through instances of physical and numerical interest. As a side-effect, we find another fascinating setting of utilization of the k-symplectic calculation: frameworks of first-request normal differential conditions [1].

The interest of mathematical methods for concentrating on frameworks of differential conditions is irrefutable. For example, symplectic and Poisson calculation strategies have been utilized to reveal intriguing designs of numerous dynamical frameworks. A Lie framework is an arrangement of first-request conventional differential conditions whose overall arrangement can be communicated as a capability, the superposition rule, of a nonexclusive limited set of specific arrangements and a bunch of constants. In mathematical terms, the Lie-Scheffers Theorem declares that a Lie framework is identical perfectly subordinate vector field taking qualities in a limited layered Lie polynomial math of vector fields: a Vessiot-Guldberg Lie polynomial math [2]. This condition is rigid to such an extent that only couple of frameworks of differential conditions can be considered as Lie frameworks. By and by, Lie frameworks show up in significant physical and numerical issues and appreciate applicable mathematical properties, which firmly brief their examination.

Some consideration has recently been paid to Lie frameworks conceding a Vessiot-Guldberg Lie variable based math of Hamiltonian vector fields as for a few mathematical designs. Shockingly, concentrating on these specific kinds of Lie frameworks prompted explore substantially more Lie frameworks and applications than previously. The primary endeavor toward this path was performed by Marmo, Cariñena and Grabowski, who momentarily concentrated on Lie frameworks with Vessiot-Guldberg Lie algebras of Hamiltonian vector fields comparative with a symplectic structure. This line of exploration was posteriorly trailed by a few specialists [3].

The overall hypothesis of Lie frameworks conceding a Vessiot-Guldberg Lie polynomial math of Hamiltonian vector fields regarding a Poisson structure, the Lie-Hamilton frameworks, was completely settled in. For example, this approach permits one to demonstrate that the notable invariant for Riccati conditions K= (x1-x3) (x2-x4) (x1-x4) (x2-x3) can be recovered as a Casimir component of a genuine Lie variable based math of Hamiltonian capabilities. Besides, this work presented the investigation of Poisson co-variable based math strategies to acquire superposition rules for these frameworks. The off limits hypothesis for Lie-Hamilton frameworks is a valuable device to lay out when Lie frameworks are not Lie-Hamilton ones as seen by its applications in the writing. In the interim, numerous such frameworks concede Vessiot-Guldberg Lie algebras of Hamiltonian vector fields concerning a Dirac structure. This can be utilized to sum up the strategies utilized for Lie-Hamilton frameworks to a bigger class of Lie frameworks: the Dirac-Lie frameworks [4,5].

We exhibit that k-symplectic Lie frameworks can be considered as Dirac-Lie frameworks in a few non-identical ways. This doesn't imply that k-symplectic Lie frameworks should be think about essentially as Dirac-Lie frameworks. For sure, the procedures contrived for k-symplectic Lie frameworks are all the more remarkable since, generally talking, they license us to utilize every one of these non-comparable Dirac-Lie frameworks simultaneously. For example, we represent that a Schwarzian condition can be concentrated as a k-symplectic Lie framework or as a Dirac-Lie framework in various habits. The k-symplectic structure permits us to get at the same time a few constants of movement leading to a superposition rule for these differential conditions. In the interim, on the off chance that we consider Schwarzian conditions as Dirac-Lie frameworks, these constants of movement should be acquired independently utilizing different mathematical contentions.

Conflict of Interest

None.

References

1. Billera, Louis J., R. Cushman and Jan A. Sanders. "The Stanley decomposition of the harmonic oscillator." *Indag Math* 91 (1988): 375-393.
2. Gazizov, Rafail K and Nail H. Ibragimov. "Lie symmetry analysis of differential equations in finance." *Nonlinear Dyn* 17(1998): 387-407.
3. Anderson, R. L., J. Harnad and P. Winternitz. "Group theoretical approach to superposition rules for systems of Riccati equations." *Lett Math Phys* 5 (1981): 143-148.
4. Sun, Yi, Ben Yong Chen and Jing Li Fu. "Lie algebraic structure and Poisson conservation law for one class of multi-dimensional coupled oscillators." *Appl Mech Mater*, Trans Tech Publications Ltd 597 (2014) 388-392.
5. Awane, A. "k-symplectic structures." *J Math Phys* 33 (1992): 4046-4052.

***Address for Correspondence:** Ivan Shestakov, Department of Mathematics and Statistics, University of São Paulo, Brazil, Email: Ivanshestakov019@gmail.com*

Received: 05 March, 2022, Manuscript No: glta-22-67943, **Editor assigned:** 07 March, 2022, PreQC No: P-67943, **Reviewed:** 20 March, 2022, QC No: Q-67943, **Revised:** 23 March, 2022, Manuscript No: R-67943, **Published:** 27 March, 2022, DOI: 10.37421/1736-4337.2022.16.327.

How to cite this article: Shestakov, Ivan. "Lie Frameworks: Hypothesis and Applications". *J Generalized Lie Theory App* 16 (2022): 327.