

Noncommutative differential direct Lie derivative and the algebra of special Euclidean group $SE(2)$

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ABSTRACT.

A Lie algebra is an algebraic structure whose main use is in studying geometric objects such as Lie groups and differentiable manifolds. The term "Lie algebra" (after Sophus Lie) was introduced by Hermann Weyl in the 1930s. Using the Lie algebra of the special euclidean group $SE(2)$ and using notions of noncommutative geometry, we can construct a new derivative which I call it direct Lie derivative. Also in this paper we define an real inner product for $A, B \in se(2)$ two elements of the Lie algebra $se(2)$. The main result of this paper consist in the proof that we can generate other Lie algebras using the direct Lie derivative elements.

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