Vector Parameter Forms of $SU(1,1)$, $SL(2,\mathbb{R})$ and their Connection with $SO(2,1)$

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ABSTRACT

The *Cayley* maps for the Lie algebras $\mathfrak{su}(1,1)$ and $\mathfrak{so}(2,1)$ converting them into the corresponding Lie groups $\mathrm{SU}(1,1)$ and $\mathrm{SO}(2,1)$ along their natural vector parameterizations are examined. Additionally, the explicit form of the covering map $\mathrm{SU}(1,1) \to \mathrm{SO}(2,1)$ and its sections are presented. Finally, the vector-parameter forms of the Lie groups $\mathrm{SU}(1,1)$ and $\mathrm{SU}(2)$ are compared and some of their applications are addressed.