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**On Differentiability of Vectors in Lie Group Representations**

We address a linearity problem for differentiable vectors in representations of infinite-dimensional Lie groups on locally convex spaces, which is similar to the linearity problem for the directional derivatives of functions. In particular, we find conditions ensuring that if  $\pi: G \rightarrow \text{End}(\mathcal{Y})$  is such a representation, and  $y \in \mathcal{Y}$  is a vector such that  $d\pi(x)y$  makes sense for every  $x$  in the Lie algebra  $\mathfrak{g}$  of  $G$ , then the mapping  $d\pi(\cdot)y: \mathfrak{g} \rightarrow \mathcal{Y}$  is linear and continuous.

**Keywords:** Lie group, topological group, unitary representation, smooth vector.

**MSC:** 22E65; 22E66, 22A10, 22A25