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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 $\pi\colon G \to \mathrm{End}(\mathcal{Y})$ is such a representation, and $y \in \mathcal{Y}$ is a vector such that $\mathrm{d}\pi(x)y$ makes sense for every x in the Lie algebra $\mathfrak{g}$ of G, then the mapping $\mathrm{d}\pi(\cdot)y\colon \mathfrak{g} \to \mathcal{Y}$ is linear and continuous.