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Singularities of invariant connections. (English summary)

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The Schmidt b-boundary is one way to study the singularities associated with linear connections or more specifically with spacetimes using the usual Levi-Civita connection. A key difficulty with the b-boundary is the difficulty of concretely constructing it for a given example. In the present paper the authors consider the special cases corresponding to reductive homogeneous spaces. Let $M = P/G$, where G is a closed Lie subgroup of P and let $\mathfrak{g}$ admit an Ad_G-invariant supplementary $\mathfrak{m}$ in $\mathfrak{p}$. The connection on M should be invariant under the translations $uG \to vuG$. The authors find that such connections are in one-to-one correspondence with certain linear maps from $\mathfrak{m}$ to $\mathrm{gl}(\mathfrak{m})$ and, if the connection comes from one on P in a certain natural way, then there are no singularities. The authors fully investigate the important special case of $P = \mathbf{R}^n$ and obtain extensive results.

Reviewed by *J. K. Beem*