Kolář, I.

Some gauge-natural operators on connections. (English) Zbl 0806.53025

Szenthe, J. (ed.) et al., Differential geometry and its applications. Proceedings of a colloquium, held in Eger, Hungary, August 20-25, 1989, organized by the János Bolyai Mathematical Society. Amsterdam: North- Holland Publishing Company. Colloq. Math. Soc. János Bolyai. 56, 435-445 (1992).

The author considers gauge-natural bundles over m-dimensional manifolds and gauge-natural operators, introduced by D. J. Eck, solving two problems. He determines all gauge-natural operators of the curvature type. More precisely, let P be a principal G-bundle, $QP \to BP$ the connection bundle of P and LP the fibre bundle associated to P, with standard fibre the Lie algebra $\mathfrak{g}$, with respect to the adjoint action. The author proves that all gauge-natural operators $Q \to LP \otimes \overset{2}{\otimes} T^*B$ are the modified curvature operators, i.e. they are obtained combining the curvature operator and the vector bundle morphism from LP into LP induced by the linear maps of $\mathfrak{g}$ commuting with the adjoint action of G. Furthermore, he studies the gauge-natural operators transforming a connection Γ on a principal fibre bundle $\pi : P \to BP$ and a linear connection Λ on BP into a linear connection on P. He constructs an operator N which transforms (Γ, Λ) into a linear connection $N(\Gamma, \Lambda)$ on P. Supposing that Λ is without torsion and $\dim G = n$, he proves that the gauge-operators transforming (Γ, Λ) into a linear connection on P form a family depending on $n^3 + n^2 + 2n$ parameters, generated by N and three families of gauge-natural difference tensors.

For the entire collection see [Zbl 0764.00002].

Reviewer: A.M.Pastore (Bari)

MSC:

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Keywords:

gauge-natural bundles; gauge-natural operators; modified curvature operators