KOLÁŘ IVAN, Masaryk University, Brno, Czechia: CONNECTIONS ON HIGHER ORDER FRAME BUNDLES AND THEIR GAUGE ANALOGIES

We present two approaches to the torsion of connections on the r-th order frame bundle $P^r M(M, G^r_m)$ of an m-dimensional manifold M. We clarify that the torsion-free connections on $P^r M$ are in bijection with the reductions of $P^{r+1} M$ to the subgroup $G^1_m \hookrightarrow G^{r+1}_m$. This enables us to introduce the r-th order exponential operator that transforms the classical torsion-free connections on M into torsion-free connections on $P^r M$. Using the methods of the theory of natural bundles and operators, we describe all natural operators transforming the classical torsion-free connections on M into connections on $P^r M$. We outline the generalization of these problems to the gauge-natural prolongations of principal bundles.