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ON THE KERNEL OF HOLONOMY

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Abstract

A connection on a principal G-bundle may be identified with a smooth group morphism $\mathcal{H} : \mathcal{GL}^\infty(M) \to G$, called a *holonomy*, where $\mathcal{GL}^\infty(M)$ is a group of equivalence classes of loops on the base M. The present article focuses on the kernel of this morphism, which consists of the classes of loops along which parallel transport is trivial. Use is made of a formula expressing the gauge potential as a suitable derivative of the holonomy, allowing a different proof of a theorem of Lewandowski's, which states that the kernel of the holonomy contains all the information about the corresponding connection. Some remarks are made about non-smooth holonomies in the context of quantum Yang-Mills theories.