Smooth loops and loop bundles

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Abstract: A loop is a rather general algebraic structure that has an identity element and division, but is not necessarily associative. Smooth loops are a direct generalization of Lie groups. A key example of a smooth loop that is not a Lie group is the loop of unit octonions. In this talk we will review some basic properties of smooth loops and their associated tangent algebras. Then, given a manifold, we introduce a loop bundle as an associated bundle to a particular principal bundle. We then see how some of the known properties of G2-structures also appear in this more general setting.