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Associative submanifolds of a G_2 manifold.

The deformation space of an associative submanifold $Y^3 \subset X^7$ in a G_2 manifold (X, φ) is locally given by the kernel of the associated Dirac operator (McLane), in a manifold with G_2 structure (i.e. when φ is not required to be harmonic) it is given by the kernel of the twisted Dirac operator (Akbulut-Salur). We will discuss various notions of deforming Y so that the deformation space becomes smooth. We can either deform Y through pseudo-associative manifolds, i.e. deforming the Gauss map (Akbulut-Salur), or by allowing φ to deform through closed positive 3-forms (D.Gayet). We will discuss ways to impose compactness by the aid of 2-framed fields.

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