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Octonionic-algebraic structure and curvature of the moduli space of G_2 manifolds

Let M be a compact irreducible G_2 manifold. The moduli space \mathcal{M} of torsion-free G_2 structures on M is a smooth manifold with an affine Hessian structure. Moreover, it carries a symmetric cubic form and a symmetric quartic form. These tensors are closely related to the curvature of the moduli space, and are built using a particular algebraic structure on 2-tensors on M that is closely related to the octonions. I will explain all of these ideas, and hopefully end with a theorem about estimates on the curvature. This is work in progress with Christopher Lin and John Loftin.