

Atiyah classes and the leading term related to singular G_2 instantons

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G_2 -manifolds via twisted connected sums are a potential carrier of critical connections and submanifolds with 1-dimensional singularities, due to the outer circle of each asymptotic cylindrical G_2 building block. Following Sá Earp-Walpuski gluing construction for smooth instantons, Walpuski proposed constructing singular G_2 -instantons on these manifolds. This requires a package of analysis adapted to the underlying geometry. In this talk, we discuss a partial analytic obstruction to such a deformation theory. It is the cohomology of a particular bundle on CP^2 and is related to a version of the Atiyah classes that govern the movement of singularities in this case. It vanishes if and only if the tangent connection is a particular one on the tangent bundle of CP^2 , which is the only case we wish to carry out the analysis. Under model data, we identify a “leading term” in the solution of the linearized equation with the vector fields that “move” the singular locus. This is a joint project with Henrique Sá Earp and Grégoire Menet.

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