Invariant solutions to the Strominger system and the heterotic equations of motion

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SUMMARY

A model for string theory was proposed in [1] involving a ten dimensional space $\mathbb{R}^{1,3} \times M^6$, where $\mathbb{R}^{1,3}$ is a Lorentzian spacetime and M^6 is a compact Calabi-Yau manifold. Strominger [5] generalized the previous construction allowing a background M^6 with a non-zero torsion. This led to a complicated system of PDEs known as the *Strominger system* which is written in terms of the fermionic and bosonic fields relevant in the physical theory. But the system can be reformulated in a geometrical way involving linear connections defined on several bundles over the background M^6.

Several works have been devoted since then to find solutions to this system. In this talk we present compact manifolds, constructed as quotients of Lie groups, providing many solutions to the Strominger system with respect to a 2-parameter family of metric connections $\nabla^{\varepsilon,\rho}$. The family $\nabla^{\varepsilon,\rho}$ is a natural extension of the canonical 1-parameter family of Hermitian connections introduced by Gauduchon but it also includes other metric connections that are of interest in the anomaly cancellation condition. Some of the examples solve in addition the most restrictive system of *heterotic equations of motion* with respect to the Bismut connection ∇^+. Concretely, we construct invariant solutions to the Strominger system with respect to the Chern connection ∇^c, with non-flat instanton and positive α' on compact complex solvmanifolds with holomorphically trivial canonical bundle found in [3]. In the semisimple case we find the first known solutions to the heterotic equations of motion on a compact quotient of SL(2,$\mathbb{C}$). We also provide many invariant solutions to the Strominger system on this manifold recovering the ones obtained in [2].

This is a joint work with Antonio Otal and Luis Ugarte [4].

Keywords: Equations of motion, linear connections, solvmanifolds.

AMS Classification: 53C80, 53C05, 32M10.

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