

Rod Gover – A conformally invariant Yang-Mills energy and equation on 6-manifolds

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A conformally invariant Yang-Mills energy and equation on 6-manifolds. The gauge field equations known as the Yang-Mills equations are extremely important in both mathematics and physics, and their conformal invariance in dimension 4 is a critical feature for many applications. In dimension 4, and when specialised to the Cartan/tractor connection, the Yang-Mills current recovers exactly the Bach tensor. This provides a nice link between the Yang-Mills equations and (for example) the conformally-Einstein condition.

We show that there is a simple and elegant route to higher order equations in dimension 6 that are analogous, and arise as the Euler-Lagrange equations of a conformally invariant action. The functional gradient of this action recovers the conformal Fefferman-Graham obstruction tensor when the gauge connection is taken to be the conformal Cartan (or tractor) connection – so there is a nice analogy to the dimension 4 case. As well as providing evidence that these equations provide a good notion of higher Yang-Mills, this result leads to potential applications to the study of Einstein 6-manifolds. Other potential applications will be touched on if time allows.

This is joint work with Larry Peterson and Callum Sleight:
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