

Workshop on "Geometry of vector distributions, differential equations, and variational problems"

SISSA, Trieste, Italy, 13–15 December 2006

Abstracts of the talks

Robert Bryant (Duke University, USA) *Conformal geometry associated to 3-plane fields in dimension 6*

Abstract: In this talk, I will provide yet another example of the link between certain conformal geometries and ordinary differential equations, along the lines of the examples discussed by Nurowski.

In this particular case, I consider the equivalence problem for 3-plane fields D on a 6-manifold M satisfying the nondegeneracy condition that $D + [D, D] = TM$.

I give a solution of the equivalence problem for such D (as Tanaka has previously), showing that it defines an $so(4, 3)$ -valued Cartan connection on a principal right H -bundle over M , where H is the subgroup of $SO(4, 3)$ that stabilizes a null 3-plane in $\mathbb{R}^{4,3}$. Along the way, I observe that there is associated to each such D a canonical conformal structure of split type on M , one that depends on two derivatives of the plane field D .

I show how the primary curvature tensor of the Cartan connection associated to the equivalence problem for D can be interpreted as the Weyl curvature of the associated conformal structure and, moreover, show that the split conformal structures in dimension 6 that arise in this fashion are exactly the ones whose $so(4, 4)$ -valued Cartan connection admits a reduction to a $spin(4, 3)$ -connection. I also discuss how this case is analogous to features of Nurowski's examples.