

RESEARCH REPORT

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1. SHORT INTRODUCTION

The construction of contact structure on every homotopy class of plane field has been a question of central importance in our understanding of contact structures in dimension bigger than 5. We know that contact structures in dimension three follow a kind of h -principle. Namely, every homotopy class of plane field carries an overtwisted contact structure. The purpose of my visit to Prof. Presas at Madrid, Spain was to discuss the possibilities of obtaining such results for five and possibly seven dimensional almost contact manifolds.

2. RESEARCH ACTIVITIES DURING THE VISIT

In collaboration with John Etnyre the visitor (Dishant M. Pancholi) had generalized the technique of Eliashberg and Thurston to construct contact structure on certain product manifolds using confoliation on higher dimensional manifolds. Prof. Presas has shown that every contact manifold carries the structure of Lefschetz pencil with fibers contact manifold. The work of Martinez-Torres ensures that any almost complex manifold embeddable in Complex projective space almost holomorphically carries a structure of Lefschetz pencil.

During my stay at Madrid, I discussed with Prof. Presas various possibilities of using these two techniques to construct contact structure on a very large class of almost contact manifolds. Namely, almost contact manifolds having almost holomorphic embedding in the complex projective space. The possibilities of such a result lies on the observation that using techniques similar to that of Eliashberg's construction of overtwisted contact structure one can produce contact structure on fibers of such manifold which varies smoothly with fibers. Using the techniques developed by Etnyre and Pancholi it would now be possible to create sufficient zones where one has transitive confoliation on any almost contact manifold (embeddable in complex projective space). During my visit we discuss in detail how to implement these ideas to produce a contact structure on an almost contact manifold in the given almost complex homotopy class.

We observed that the case where these techniques produces contact structure relatively easily is the case when we have an honest fibration without singularities. Our next task is to extend this results to first the case when we have Lefschetz fibration using the special form of singularity and then to the case when we have a pencil.