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2:00 PM
258 Hurley Hall

Title: A Compendium of Pseudoholomorphic Puppies in R times Gamma \ G

Abstract:

The goal of this talk is to introduce the method of pseudoholomorphic pullback equations in the context of symplectizations of closed threemanifolds with an almost complex structure adjusted to a trivializable contact structure. In this context, the existence of pseudoholomorphic curves is equivalent to the existence of a special point on the manifold called a closing point. The primary advantage of this method is that it allows us to separate the existence and classification problems into an analytic part and a topological part.

The analytic part involves proving the existence of pairs of (1; 0)-forms (alpha; beta) satisfying a non-linear perturbed Cauchy-Riemann system on the complex plane with regular singularities, polar boundary conditions, and a boundary relation. The existence of these solution pairs are proved by introducing weighted singular Floer operators on model domains, using index theory, and applying a generalization of Kakutani's fixed point theorem applicable in Banach spaces. The topological part involves integrating the solution pairs under the assumption that closing points exist to construct finite energy pseudoholomorphic curves and then demonstrating the existence of closing points.

In general, proving the existence of closing points is a difficult task. However, a class of minimal contact structures exists for which the existence of closing points can be transformed into tractable group theoretic properties. This allows us to construct and classify finite energy pseudoholomorphic curves in many situations. These minimal contact structures are the contact analogue of Thurston's homogeneous metrics. The framework developed here in order to prove the existence of closing points relates the Bianchi classification of three dimensional Lie groups to Thurston geometries. In the process of developing this framework, Kleinian groups and character varieties associated to fundamental groups defined by generators and relations will be discussed.