Introduction to h-principle (MATH 271)

M-F, 12.45-2.00, Room 383N

http://math.stanford.edu/~nmish/

Differential relations and the h-principle.

The language of jets. Holonomic section of jets space.
Differential relations. Diff V-invariant differential relations.
Homotopy principle.

Holonomic approximation and the Smale-Gromov h-principle.

Holonomic approximation theorem.

Examples of applications:

- Gromov's h-principle for open Diff V-invariant differential relations over open manifolds;
- immersions and submersions of open manifolds, foliations on open manifolds;
- approximation of differential forms by closed forms, symplectic and contact structures on open manifolds;
-directed embeddings of open manifolds.

The microextension trick. Immersions of closed manifolds, Smale's sphere inversion, maps transversal to distributions.

Microflexible differential relations. Symplectic and contact immersions and embeddings.

Gromov's convex integration theory

One-dimensional convex integration. Parametric version of one-dimensional convex integration. Principal subspaces and ample differential relations. Iterated convex integration.

Examples of applications:

- immersions and k-mersions;
- systems of linear independent exact forms and divergence free vector fields;
- directed immersions;
- totally real embeddings.

Nash-Kuiper theorem on C^1-isometric embeddings.

Mappings with simple singularities

Multivalued solutions of differential relations. Wrinkling theorem.

Examples of application:

- Thurston's theorem on foliations of codimension greater than one;
- Eliashberg's theorem on mappings with prescribed singularities;
- application to pseudoisotopy theory.

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