

# DIFFERENTIABLE STRUCTURES ON FINITE SETS

organized by  
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## Workshop Summary

At the Workshop there were lectures on the following topics:

1. Extension Theorems for Sobolev spaces on arbitrary sets (Fefferman, Israel, Shvartsman).
2. Algorithmic questions of smooth extensions; sparsifiers (Klartag)
3. Sobolev extension domains (Shvartsman, Zobin).
4. Connections between exotic smooth structures and physics (Lo).
5. LeGruyer's Theorem (Fefferman)
6. Linear extension operators (Luli).

In the afternoons there were discussion groups on the above topics and also on additional problems including:

7.  $C^\infty$  algebraic geometry (Nicoara)
8. Jet ideals (Fefferman, Guckenheimer, Klartag, Nicoara, Zobin).
9. Natural extension operators from domains (Goldshtein, Zobin).
10. Analogs of sparsifiers for Whitney problems (Klartag, Naor).
11. Applied problems (Guckenheimer, Yomdin).

Progress made:

There were two solutions of the Whitney extension problem for the spaces  $L_p^2(\mathbb{R}^2)$ , by Israel, and by Shvartsman. The solutions are very different and the relations between the final answers are still not clear, but we have made some progress towards understanding this.

There was progress towards a solution of the problem of description of Sobolev extension domains for arbitrary smoothness in the plane; a necessary geometric condition was obtained by Zobin, and a sufficient condition was earlier obtained by Shvartsman. The conditions seem to be quite close, we hope that they coincide.

A plausible elementary inequality for polynomials arose from the discussion of jet ideals, but Guckenheimer found a counter-example.

It appeared briefly that the known results about sparsifiers were relevant to algorithmic aspects of Whitney problems, but more careful examination showed that new results on sparsifiers would be needed; the required new properties of sparsifiers may or may not be true.

The organizers would like to thank Brian Conrey and the whole AIM staff for an excellent job in making the meeting pleasant and productive.