DIFFERENTIAL GEOMETRY/PDE SEMINAR

Wednesday, Febuary 17, 2010
Padelford C-36
4–5PM

BV function in irregular regions

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In 1960 V.Mazya discovered a deep connection between embedding theorems of mathematical physics (like the Sobolev inequality) and geometric properties of regions in which these theorems are still correct. If integral inequalities involve high derivatives, the "geometric" conditions have to be formulated in terms of capacities. But in the case of the first derivatives, the properties of the regions are described by some isoperimetric type inequalities. (Similar results for the first derivatives were obtained by H.Federer almost simultaneously.)

Later V.Mazya and me considered BV functions in strongly irregular regions (Ω), and generalized most of the results for the first derivatives to this case. More precisely, we considered sets with finite perimeters in the sense of Caccioppoli and De Giorgi. First, we obtained geometrical conditions on Ω which were equivalent, or implied some integral inequalities. Also we found conditions under which BV function can be extended to the whole $\mathbb{R}^n$ with a good norm control. And we defined the trace on $\partial\Omega$) for each BV function and got some integral inequalities for it.

Recently N.Kosovsky and I generalized the notion of trace and the results concerning it to the case of countably $(n-1)$-rectifiable sets. We proved that such a trace has nice properties and all previous results about trace can be extended to the new situation.

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