



KARLSTAD, FEBRUARY 9, 2017

Symposium in Functional and Harmonic Analysis

Room 21E302

13:00-13:35 *How not to leave traces*

Lubos Pick, Charles University of Prague

A trace is an important subject in the study of properties of weakly differentiable functions on R^n and in particular of its applications to boundary value problems. In a generalized sense, a trace represents the restriction of a function to a submanifold of lower dimension, d . While the theory works quite beautifully provided that this d is not too small, things turn into a total havoc when d is smaller than the critical value $n - m$ where m , $m < n$, is the highest order of the weak derivatives involved. A reasonable person would at this stage leave traces and do something more sensible. We do not leave traces. Instead, we develop a crazy new method of dealing with this subcritical case, based on combination of recent potential estimates by Korobkov and Kristensen and a fairly general concept of Frostman measures. This is a joint work with Andrea Cianchi of Firenze and Lenka Slavikova of Columbia, MO.

13:40-14:15 *New estimates for minimizers of variational integrals*

Maria Alessandra Ragusa, University of Catania

We present the partial and global regularity problem for minimizers

$$u(x): \Omega \subset \mathbf{R}^m \rightarrow \mathbf{R}^n$$

of quadratic growth functional

$$\int_{\Omega} A(x, u, Du) dx$$

We assume only that $A(\cdot; u; p)$ is in the class VMO of functions with vanishing mean oscillation, but not its continuity with respect to x . The results are from a joint work with Professor Atsushi Tachikawa.

13:40-14:15 *The Wielandt inequality in normed spaces*

Gord Sinnamon, University of Western Ontario

The generalized Wielandt inequality relates the condition number of a complex matrix and the amount by which the action of the matrix may distort angles. In normed spaces, it leads to a notion of norm equivalence that is stronger than the usual, topological, equivalence of norms.

14:15-15:15 *Coffee break*



15:15-15:50 Restricted weak type extrapolation with applications to average operators
Maria J. Carro, University of Barcelona

The main goal of this talk is to present several applications of a recent extension of Rubio de Francia extrapolation theorem in the setting of weighted restricted weak type inequalities. The main advantage of this method is that we can obtain end-point estimates, contrary to what happens in the classical method. We shall also discuss the still open case of multilinear operators.

15:55-16:30 Extensions of the weak type $(1, 1)$ property for singular integral operators
Carlos Pérez, University of the Basque Country, BCAM and Ikerbasque

Muckenhoupt-Wheeden [2] in the seventies and Sawyer [5] in the eighties established one-dimensional highly nontrivial extensions of the weak type $(1, 1)$ property of the maximal function involving weights. These results were conjectured to hold for the Hilbert transform and for the maximal function in higher extensions. In the first part of this lecture we will survey about these conjectures that were proved and extended in different directions in [1] and [3]. In the second part we will discuss a recent joint work with Israel P. Rivera-Ríos [4] showing the intimate connection of these estimates with the commutators of singular integral operators with BMO functions. In the third part we will discuss some recent progress in this direction for Rough Singular Integral Operators (joint work with Kangwei Li, Israel P. Rivera-Ríos, Luz Roncal).

References:

- [1] D. Cruz-Uribe, SFO, J.M. Martell and C. Pérez, *Weighted weak-type inequalities and a conjecture of Sawyer*, Int. Math. Research Notices, 30 (2005), 1849-1871.
- [2] B. Muckenhoupt and R. Wheeden, *Some weighted weak-type inequalities for the Hardy-Littlewood maximal function and the Hilbert transform*, Indiana Math. J. 26 (1977), 801-816.
- [3] S. Ombrosi and C. Pérez, *Mixed weak type estimates: Examples and counterexamples related to a problem of E. Sawyer*, Colloquium Mathematicum, 145 (2016), 259-272.
- [4] C. Pérez and Israel P. Rivera-Ríos, *Three observations on commutators of Singular Integral operators with BMO functions*, AWM-Springer Series, Proceedings in honor of Cora Sadosky, to appear.
- [5] E. Sawyer, *A weighted weak type inequality for the maximal function*, Proc. Amer. Math. Soc., 93 (1985), 610-614.