Analysis and Operator Theory Seminar - Peter Takac

Tuesday, February 23, 2016 - 2:10pm to 3:00pm
Cockins 240

Title: On Compact Support Solutions to Parabolic Problems with the p-Laplacian for $p > 2$ and Their "Counterparts" for $p < 2$

Speaker: Peter Takac (University Rostock, Germany)

Abstract: The validity of the weak and strong comparison principles for degenerate parabolic partial differential equations with the p-Laplace operator $\Delta_p(u) = \mathrm{div}(|\nabla u|^{p-2}\nabla u)$ will be discussed for $p > 2$ (the "degenerate" case) and for $1 < p < 2$ (the "singular" case). This problem is reduced to the comparison of the trivial solution ($\equiv 0$, by hypothesis) with a nontrivial nonnegative solution $u(x,t)$. The problem is closely related also to the question of uniqueness of a nonnegative solution via the weak comparison principle. In this presentation, for $p > 2$ realistic counterexamples to the uniqueness of a nonnegative solution, the weak comparison principle, and the strong maximum principle are constructed with a $nonsmooth$ reaction function that satisfies neither a Lipschitz nor an Osgood standard "uniqueness" condition. Nonnegative $multi-bump$ solutions with spatially disconnected compact supports and zero initial data are constructed between sub- and supersolutions that have supports of the same type. For $1 < p < 2$ we will show that a nonnegative solution $u(x,t)$ to the parabolic Cauchy problem in $RR^N \times (0,T)$ with nonnegative sources and nontrivial initial values $u(x,0) \geq 0$ becomes positive immediately for any $t \in (0,T_0) \subset (0,T)$, i.e., $u(x,t) > 0$ for every $x \in RR^N$. Finally, we adapt this result also to the Dirichlet problem in a bounded spatial domain $\Omega \subset RR^N$ with a completely different proof based on well-known results.

Download abstract [pdf]

◀ JANUARY 2019 ▶

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		