COLLOQUIUM
UNIVERSITY OF PITTSBURGH
FRIDAY, APRIL 11, 2008
704 THACKERAY HALL

4:00 P.M.

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TULANE UNIVERSITY

GLOBAL BIFURCATION OF QUASILINEAR
ELLIPTIC SYSTEMS ON BOUNDED DOMAINS

ABSTRACT: A powerful tool to understand the global structure of the solution sets of nonlinear elliptic systems is Rabinowitz's global bifurcation theorem. As people with experience in this know, the first thing to do is to convert the PDEs into a nonlinear functional equation whose principal part is a "compact perturbation of the identity" in a function space. When the elliptic system has boundary conditions that are either nonlinear or involve the bifurcation parameter, this conversion part is often ad hoc and cumbersome.

For nonlinear Fredholm mappings with zero index, Fitzpatrick, Pejsachowicz and Rabier haveestablished an abstract theory, in particular, a global bifurcation result that allows us to tackle the elliptic system directly. In a joint work with Junping Shi, we build a brigde between the abstract theory and its application to reaction-diffusion systems on bounded domains by supplying sufficient conditions for zero Fredholm index, and by provingan abstract "unilateral global bifurcation" result in the new framework that is needed when we study positive solutions.

The talk will be accessible to graduate students. I will supply two examples (a chemotactic diffusion system and a cross-diffusion system) to demonstrate why weneed to and howweuse the abstract theory.

Refreshments served at 3:30 p.m.
in the Math Dept. COMMON ROOM, Thackeray 705