On a new perspective on Bifurcation Theory

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The aim of this talk is to introduce the (local and global) bifurcation theorems in the setting of Fredholm operators of index zero obtained by J. López-Gómez and the speaker (2021). This results generalize the classical M. G. Crandall and P. H. Rabinowitz local bifurcation theorem (1971) and the global alternative of P. H. Rabinowitz (1971). Our approach is based on a new geometrical point of view of the classical Crandall-Rabinowitz transversality condition via the notion of generalized algebraic multiplicity χ introduced by J. Esquinas and J. López-Gómez (1988). More precisely, we relate χ with the local intersection index of algebraic varieties so establishing a connection between nonlinear spectral theory and algebraic geometry. We apply this machinery to analyse the global structure of the set of positive solutions of a quasilinear problem involving mean curvature operator and mixed boundary conditions.