1019-35-99 **Jianxin Zhou*** (`jzhou@math.tamu.edu`), Department of Mathematics, Texas A&M University, College Station, TX 77843. *A Local Theory for Finding Multiple Solutions.*

Most characterizations of multiple solutions to a variational problem in the literature are in the global sense, such as the wellknown Ljusternik-Schnirelmann theorem, the mountain-pass lemma, various linking and saddle point theorems. They characterize a solution as a solution to a two-level global minimax problem and therefore are not for numerical algorithm implementation. In this talk, the speaker presents a local theory: started from a local minimax method for finding multiple solutions and their local instability index to a variational problem; extended to a local min-$\perp$ method and then a local $\perp$-$\perp$ method. Local characterization of multiple co-existing solutions to a variational system (cooperative/noncooperative) and to a semi-variational system, i.e., each equation in the system is variational, will be presented. Such a method opens a door to computing multiple solutions to a nonvariational problem. Some basic properties and applications of such local characterizations will be discussed. (Received August 08, 2006)