

ON TOPOLOGICAL DEGREE THEORY FOR MAPPINGS OF CLASS (LS_+) IN REFLEXIVE BANACH SPACES

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Abstract. In this paper, we introduce the mapping of class (LS_+) in reflexive Banach spaces, which is a generalization of the mapping of class (S_+) , and then we construct a degree theory for mappings of class (LS_+) .

Key Words: Brouwer's degree theory, Leray-Schauder degree, monotone and maximal monotone operators, mappings of classes (S_+) , $(S_+)_L$ and (LS_+) , L -pseudo-compact mapping, homotopy of mappings of class (LS_+) , pseudo-monotone and generalized pseudo-monotone mappings, topological degree.

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1 Introduction and Preliminaries

In 1934, Leray and Schauder generalized Brouwer's degree theory to an infinite Banach space and established the so called Leray-Schauder degree. It turns out that the Leray-Schauder degree is a very powerful tool in proving various existence results for nonlinear partial differential equations. So there rises a very natural problem: For what kind of mappings, can we establish a degree theory? Many people has studied this problem, degree theories for non-compact mappings, such as k -set contraction mapping, A -proper mapping, mappings of class (S_+) , have been established. Many degree theories are defined in the case that the corresponding mapping is defined on some open subset, but for monotone type mappings, their domain may have empty interior, so the degree theories of Browder [5], Berkovitz and Mustonen [2], Skrypnik [14], Zhang and Chen [15], will not be applicable. In some

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