Existence Results for Multivalued Operators of Monotone Type in Reflexive Banach Spaces

Dhruba Adhikari

Department of Mathematics
Kennesaw State University
1100 South Marietta Pkwy, Marietta, GA 30060, USA
e-mail: dadhikar@kennesaw.edu

Abstract

Let X be a real reflexive Banach space and X^* its dual space. Let $T : X \supset D(T) \to 2^{X^*}$ be an operator of class $\mathcal{A}_G(S_+)$, where $G \subset X$. A result concerning the existence of pathwise connected sets in the range of T is established, and as a consequence, an open mapping theorem is proved. In addition, for certain operators T of class $\mathcal{B}_G(S_+)$, the existence of nonzero solutions of $0 \in Tx$ in $G_1 \setminus G_2$, where $G_1, G_2 \subset X$ satisfy $0 \in G_2$ and $\overline{G_2} \subset G_1$, is established. The Skrypnik's topological degree theory is used, utilizing approximating schemes for operators of classes $\mathcal{A}_G(S_+)$ and $\mathcal{B}_G(S_+)$, along with the methodology of a recent invariance of domain result by Kartsatos and the author.