1116-46-1354 **Teffera M. Asfaw*** (teffera6@vt.edu), Virginia Tech, Department of Mathematics, 576 McBryde Hall, Blacksburg, VA 24061. *A new topological degree theory for pseudomonotone perturbations of the sum of two maximal monotone operators and applications.*

Let X be a real reflexive locally uniformly convex Banach space with locally uniformly convex dual space X^* and G be a nonempty, bounded and open subset of X . Let $T : X \supseteq D(T) \to 2^{X^*}$ and $A : X \supseteq D(A) \to 2^{X^*}$ be maximal monotone operators. Assume, further, that, for each $y \in X$, there exists a real number $\beta(y)$ and there exists a strictly increasing function $\phi : [0, \infty) \to [0, \infty)$ with $\phi(0) = 0$, $\phi(t) \to \infty$ as $t \to \infty$ satisfying

$$\langle w^*, x - y\rangle \geq -\phi(\|x\|)\|x\| - \beta(y)$$

for all $x \in D(A)$, $w^* \in Ax$, and $S : X \to 2^{X^*}$ be bounded of type (S_+) or bounded pseudomonotone such that $0 \notin (T + A + S)(D(T) \cap D(A) \cap \partial G)$ or $0 \notin \overline{(T + A + S)(D(T) \cap D(A) \cap \partial G)}$, respectively. New degree theory is developed for operators of the type $T + A + S$ with degree mapping $d(T + A + S, G, 0)$. The theory developed herein generalizes the Asfaw and Kartsatos degree theory for operators of the type $T + S$. New results on surjectivity and solvability of variational inequality problems are obtained. The degree theory developed herein is used to show existence of weak solution of nonlinear parabolic problem in appropriate Sobolev spaces. (Received September 18, 2015)