Anti-N-Order Polynomial Daugavet Property on Banach Spaces

John Emenyu
Mbarara University of Science and Technology, Uganda

We generalize the notion of the anti-Daugavet property (a-DP) to the anti-N-order Almasi room, polynomial Daugavet property (a-NPDP) for Banach spaces. The characterization SBS of the a-NPDP is through the spectral information; however, it is well-known in nonlinear theory that there is no suitable notion of the spectra for nonlinear operators resulting into enormous structural challenges to the known characterization techniques for the a-DP. To bypass some of the problems, we establish that a good spectrum of a nonlinear operator is one whose associated eigenvectors are of unit norm and study the a-NPDP for locally uniformly convex or smooth Banach spaces (luacs); in particular, we prove that locally convex or smooth finite dimensional Banach spaces have the a-mDP for rank-I polynomials and then extend this result to innite dimensional luacs Banach spaces. Besides, we prove that locally uniformly convex Banach spaces have the a-NPDP for compact polynomials if and only if their norms are eigenvalues, and moreover, uniformly convex Banach spaces have the a-NPDP for continuous polynomials if and only if their norms belong to the approximate spectra. As a consequence of these results, we conclude that all continuous In-homogeneous polynomials that satisfy the N-order polynomial Daugavet equation on a uniformly convex Banach space such as Lr-spaces for $1 < r < 1$ and Hilbert spaces have nontrivial invariant subspaces; this result was not known.

Keywords: Banach spaces; local and uniform convexity; polynomials; N-order polynomial Daugavet equation; anti-N-order Daugavet property.