Wen Yuan
Beijing Normal University, People's Republic of China

Brezis-Van Schaftingen-Yung Formulae in the Setting of Ball Banach Function Spaces

Let X be a Ball Banach function space. In this talk, we first recall a surprising formula recently obtained by Brezis-Van Schaftingen-Yung on a new characterization of the Sobolev space $W^{1,1}(\mathbb{R}^n)$. Then, under the mild assumption that the Hardy–Littlewood maximal operator is bounded on the associated space of X, and via some new proofs, we establish the Brezis-Van Schaftingen-Yung formula in a more general setting of Ball Banach function space X. This generalization has a wide range of applications and, particularly, enables us to establish new fractional Sobolev and Gagliardo–Nirenberg inequalities in various function spaces, including Morrey spaces, mixed-norm Lebesgue spaces, variable Lebesgue spaces, weighted Lebesgue spaces, Orlicz spaces, and Orlicz-slice (generalized amalgam) spaces.