Abstract

The main purpose of this article is to generalize a theorem of Stepanov which provides a necessary and sufficient condition for almost everywhere differentiability of functions over Euclidean spaces. We state and prove an L^p-type generalization of the Stepanov theorem and then we extend it to the context of Orlicz spaces. Then, this generalized Rademacher–Stepanov type theorem is applied to the Sobolev and bounded variation maps with values into a metric space. It is shown that several generalized differentiability type theorems are valid for the Sobolev maps from a Lipschitz manifold into a metric space. As a byproduct, it is shown that the Sobolev spaces of Korevaar–Schoen and Reshetnyak are equivalent.