VOLTERRA–CHOQUET NONLINEAR OPERATORS

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ABSTRACT. In this paper we study to what extent properties of the classical linear Volterra operators can be transferred to the nonlinear Volterra–Choquet operators, obtained by replacing the classical linear integral with respect to the Lebesgue measure, by the nonlinear Choquet integral with respect to a nonadditive set function. Compactness, Lipschitz and cyclicity properties are studied.

1. Introduction

Inspired by the electrostatic capacity, G. Choquet has introduced in [6] (see also [7]) a concept of integral with respect to a non-additive set function which, in the case when the underlying set function is a σ-additive measure, coincides with the Lebesgue integral.

Choquet integral is proved to be a powerful and useful tool in decision making under risk and uncertainty, finance, economics, insurance, pattern recognition, etc (see, e.g. [39] and [40] as well as the references therein).

Many new interesting results were obtained as analogs in the framework of Choquet integral of certain known results for the Lebesgue integral. In this sense, we can mention here, for example, the contributions to function spaces theory in [5], to potential theory in [1], to approximation theory in [14]–[16], [19], [20] and to integral equations theory in [17], [18].