

ON THE CONVERGENCE OF SEQUENCES OF VECTOR VALUED FUNCTIONS

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Abstract. Four types of convergence for sequences of vector valued functions are investigated. Their interrelationships are explored.

Keywords. Γ_C -convergence; Painlevé-Kuratowski convergence; Continuously convergence; Pointwise convergence; Vector valued functions.

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1 Introduction

Given an optimization problem or a control problem, the study of the behaviour, under perturbations of the data, of the set of the solutions is one of the interesting topics(see, e.g.,[1, 8, 14, 3, 4, 5]). Attouch [1] investigated minimization problems and developed a convergence theory for sequences of scalar valued functions, called Γ -convergence (or epi-convergence), which may be regarded as the “weakest” notion allowing to approach the limit in the corresponding minimization problems. This concept of convergence thus has natural applications in all branches of optimization theory—from stochastic optimization, optimal control, numerical analysis and approximation to calculus of variations and perturbation problems in physics. Recently, the notion of Γ -convergence has been generalized to the case of vector valued functions in two different ways, these generalizations are called, respectively, Γ_C -convergence (see [11]) and Painlevé-Kuratowski convergence (see [6]). People often use these two notions to study the stability of vector optimization problems. Oppezzi and Rossi [11] investigated the stability of vector valued problems when the sequence of vector valued functions Γ_C -converges to the original vector-valued functions. Huang [7] discussed the stability of the sets of efficient points of vector valued problems when the vector valued functions Painlevé-Kuratowski converge to the original vector-valued functions and improved the corresponding results of [2]. Li and Zhang [9] studied the well-posedness, which is a type of stability, of the set of the minimal solutions for vector valued optimization problems by the definition of Γ_C -convergence. On the other hand, some common notions of convergence, such as continuously convergence and pointwise convergence were also used to study the stability of