Topological Methods in Nonlinear Analysis
Volume 59, No. 2B, 2022, 941–956
DOI: 10.12775/TMNA.2021.046

A MEASURE DIFFERENTIAL INCLUSION WITH TIME-DEPENDENT MAXIMAL MONOTONE OPERATORS

Dalila Azzam-Laouir

Abstract. In this paper we establish the existence and uniqueness result of right continuous bounded variation solution for a perturbed differential inclusion governed by time-dependent maximal monotone operators.

1. Introduction

Let $I = [0, T]$ $(T > 0)$. In this paper we consider the following perturbed evolution differential inclusion in a separable Hilbert space $\mathcal{H}$,

$$-Du(t) \in A(t)u(t) + f(t, u(t)) \quad \text{a.e.}, \quad u(0) = u_0, \tag{1.1}$$

where for each $t \in I$, $A(t)$ is a maximal monotone operator on $\mathcal{H}$, the set-valued map $t \mapsto A(t)$ is right continuous with bounded variation (BVRC), in the sense that there exists a function $\rho\colon I \to [0, \infty[$, which is right continuous on $[0, T[$ and nondecreasing with $\rho(0) = 0$ and $\rho(T) < \infty$ such that

$$\operatorname{dis}(A(t), A(s)) \le d\rho(]s, t]) = \rho(t) - \rho(s), \quad 0 \le s \le t \le T,$$

here $\operatorname{dis}(\,\cdot\,,\,\cdot\,)$ is the pseudo-distance between maximal monotone operators introduced by Vladimirov [29]; see relation (2.9), and, finally, $f\colon I \times \mathcal{H} \to \mathcal{H}$

2020 *Mathematics Subject Classification.* Primary: 34A60, 28A25; Secondary: 28C20.
Key words and phrases. Bounded variation; differential measure; Lipschitz mapping; maximal monotone operator; pseudo-distance; right continuous.
The author was supported by the DGRSDT, PRFU project number C00L03UN180120 180005.