

Some variational convergence results for a class of evolution inclusions of second order using Young measures

Chales Castaing¹, Paul Raynaud de Fitte² and Anna Salvadori³

¹ Département de Mathématiques, Université Montpellier II, 34095 Montpellier Cedex 5, France

² Laboratoire Raphaël Salem, UMR CNRS 6085, UFR Sciences, Université de Rouen, 76821 Mont Saint Aignan Cedex, France

³ Dipartimento di Matematica, Università di Perugia, via Vanvitelli 1, 06123 Perugia, Italy

Received: May 6, 2004

Revised: September 6, 2004

JEL classification: C61

Mathematical Subject Classification (2000): 49J40, 49J45, 46N10, 34G25

Summary. This paper has two main parts. In the first part, we discuss the existence and uniqueness of the $W_E^{2,1}$ -solution $u_{\mu,\nu}$ of a second order differential equation with two boundary points conditions in a finite dimensional space, governed by controls μ, ν which are measures on a compact metric space. We also discuss the dependence on the controls and the variational properties of the value function $V_h(t, \mu) := \sup_{\nu \in \mathcal{R}} h(u_{\mu,\nu}(t))$, associated with a bounded lower semicontinuous function h . In the second main part, we discuss the limiting behaviour of a sequence of dynamics governed by second order evolution inclusions with two boundary points conditions. We prove that (up to extracted sequences) the solutions stably converge to a Young measure ν and we show that the limit measure ν satisfies a Fatou-type lemma in Mathematical Economics with variational-type inclusion property.

Key words: Fatou lemma, value function, second order differential equation, second order differential inclusion, Young measure, fiber product.