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PII: S0947-3580(16)30085-1
DOI: 10.1016/j.ejcon.2017.05.006
Reference: EJCON 213

To appear in: *European Journal of Control*

Received date: 2 August 2016
Revised date: 29 April 2017
Accepted date: 13 May 2017

Please cite this article as: Moustapha Dieye, Mamadou Abdoul Diop, Khalil Ezzinbi, Optimal feedback control law for some stochastic integrodifferential equations on Hilbert spaces, *European Journal of Control* (2017), doi: 10.1016/j.ejcon.2017.05.006

Optimal feedback control law for some stochastic integrodifferential equations on Hilbert spaces

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Abstract

In this work, we consider a class of partially observed stochastic integrodifferential equations on Hilbert spaces subject to measurement uncertainty. We prove the existence of optimal feedback control law from a class of operator valued functions furnished with the product topology. This work is an extension of [3] for uncertain systems governed by stochastic differential equations on Hilbert spaces ; whereby the measurement uncertainty is a square integrable stochastic process. We illustrate the abstract results proved by analyzing an example.

Keywords: Tychonoff theorem, integrodifferential equations, feedback control, resolvent operators, compact operators, Hilbert spaces
2010 MSC: 00-01, 99-00

1. Introduction

Stochastic optimal control is a technical subject, much of which centers around mathematical issues of existence and regularity and is not directly relevant from an engineering perspective. Nonetheless the theory has a large number of applications, see for instance [1, 2] and the references therein. Without control systems there could be no manufacturing, no vehicles, no computers, no regulated environment-in short, no technology. Control systems are what make machines, in the broadest sense of the term, function as intended. In applications of control theory, there are many problems in physical sciences and engineering where open loop control is not feasible. Control systems are most often based on the principle of feedback, whereby the signal to be controlled is compared to a desired reference signal and the discrepancy used to compute corrective control action. Examples are traffic control in computer communication networks. The controller must use the noisy information and

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