

WEAK APPROXIMATIONS FOR WIENER FUNCTIONALS

ALBERTO OHASHI

ABSTRACT

In this paper we introduce a simple space-filtration discretization scheme on Wiener space which allows us to study weak decompositions of some Wiener functionals and their differentiability with respect to the Brownian motion. In this setup, we obtain an *explicit robust* sequence of special semimartingales with respect to discrete-jumping filtrations which converges to a given weak Dirichlet process. The main novelty here is the approximation of erratic continuous processes (e.g. fractional exponentials) by means of a stochastic derivative operator on Wiener space introduced in this work.

As a by-product, we are able to approximate densities of square-integrable Brownian martingales in a very explicit way without assuming smoothness in the sense of Malliavin calculus. Applications of our abstract results to optimal stopping problems and martingale representation are also presented.

IBMEC SÃO PAULO SCHOOL OF BUSINESS, 04546-042 SÃO PAULO SP, BRAZIL
E-mail address: albertmfo@isp.edu.br