Banach space-valued functionals of the Wiener process

Badri Mamporia* and Omar Purtukhia**

*Georgian Technical University, Muskhelishvili Institute of Computational Mathematics, Tbilisi, Georgia;
**Ivane Javakhishvili Tbilisi State University: A.Razmadze Mathematical Institute; Faculty of Exact and Natural Sciences, Department of Mathematics, Tbilisi, Georgia

E-mail: *badrimamporia@yahoo.com; **o.purtukhia@gmail.com

Abstract. The problem of representation of the Banach space-valued functionals of the one dimensional Wiener process by the Ito stochastic integral is considered. Recently (see [1]) we developed this problem in case where the joint distribution of the Wiener process and of its functional is Gaussian. In the general case, for the Banach space-valued functional, we found the generalized random process as an integrand. We consider a generalized stochastic integral for a wide class of predictable random processes and reduce the problem of the existence of a Banach space-valued integrand process to the problem of decomposability of a generalized random element. further, we found the sequence of predictable step functions converging to the integrand function for the one dimensional case; after that, we construct the corresponding sequence of generalized random processes converging to the integrand, which we obtained for a Banach space-valued functional.

References

[1] B. Mamporia and O. Purtukhia. On functionals of the Wiener process in a Banach space. Transactions of A. Razmadze Mathematical Institute, Elsevier. Volume 172, Issue 3, Part A, December 2018, Pages 420-428.

Keywords. Wiener process, functional of the Wiener process, Ito stochastic integral, covariance operator in Banach space.

2010 Mathematics Subject Classification. 60B11, 60H5, 60H10, 37L55.