

This thesis extends the existing results in the theory of random dynamical systems driven by fractional noise in Hilbert space. In particular, it broadens the scope of applicability of the results presented by Maria J. Garrido-Atienza, Bohdan Maslowski and Jana Snuparkova in Garrido-Atienza et al. [2016] for fractional noise whose sample paths have a Hölder exponent greater than $1/2$. The main object of the research is the following stochastic equation:

$$du(t) = (A(t)u(t) + F(u(t)))dt + Bu(t)d\omega(t), \quad u(0) = u_0 \in V,$$

where $(V, \|\cdot\|_V)$ is a separable Hilbert space, ω is a stochastic process and the stochastic integral is understood in the Zähle sense.

This thesis contains the proof of a Fubini-type theorem for integration in the sense of Zähle. It is shown that the assumption about ergodicity for the underlying fractional noise in Garrido-Atienza et al. [2016] is redundant and the statements about random dynamical systems which are generated by the solution of the equation and its random attractor remain valid. The thesis also contains the proof of the existence and uniqueness of the solution to the equation above.