On set-valued and fuzzy stochastic differential equations

Marek T. Malinowski
Faculty of Mathematics, Computer Science and Econometrics, University of Zielona Góra, Poland
M.Malinowski@wmie.uz.zgora.pl

Set-valued and fuzzy stochastic differential equations generalize the classical notion of stochastic differential equation. They can be considered as mathematical tools for modeling phenomena subjected to stochastic uncertainty (randomness) and epistemic uncertainty (vagueness, fuzziness). In our talk we will discuss the concepts of set-valued and fuzzy stochastic integrals. Next we will formulate the set-valued stochastic differential equation and its generalization – fuzzy stochastic differential equations. Some existence and uniqueness theorems for such the equations will be presented. Also some examples of applications will be shown.

References

[1] *M. Kisielewicz*: Some properties of set-valued stochastic integrals. J. Math. Anal. Appl. *388* (2012), 984–995.

[2] *M. T. Malinowski*: On random fuzzy differential equations. Fuzzy Sets Syst. *160* (2009), 3152–3165.

[3] *M. T. Malinowski*: Existence theorems for solutions to random fuzzy differential equations. Nonlinear Anal. TMA *73* (2010), 1515–15632.

[4] *M. T. Malinowski, M. Michta*: Stochastic fuzzy differential equations with an application. Kybernetika *47* (2011), 123–143.

[5] *M. T. Malinowski*: Random fuzzy differential equations under generalized Lipschitz condition. Nonlinear Anal. RWA *13* (2012), 860–881.

[6] *M. T. Malinowski*: Strong solutions to stochastic fuzzy differential equations of Itô type. Math. Comput. Modelling *55* (2012), 918–928.

[7] *M. T. Malinowski*: Itô type stochastic fuzzy differential equations with delay. Systems Control Lett. *61* (2012), 692–701.

[8] *M. T. Malinowski*: Some properties of strong solutions to stochastic fuzzy differential equations. Inform. Sci. (2013), http://dx.doi.org/10.1016/j.ins.2013.02.053