STOCHASTIC EVOLUTIONARY EQUATIONS

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The project at hand is devoted to an extension of the (deterministic) solution theory for evolutionary equations ([3, Lecture 6]) to stochastic partial differential equations. More precisely, we will discuss equations of the form

$$(\partial_{t,\nu} M(\partial_{t,\nu}) + A)U = F(U), \tag{1}$$

where in this case $F(U)$ is an implementation of the stochastic integral. The solution theory for equations of the form (1) for uniformly Lipschitz continuous right-hand sides $U \mapsto F(U)$ is rather easy to obtain with the help of a contraction mapping argument. Thus the focus of the project will be to show that the Ito-integral with respect to an infinite-dimensional Brownian motion can be realised as uniformly Lipschitz continuous mappings. The core of the material is covered in [2]; a generalisation can be found in [1].

This project is suited for 3 to 4 students.

References

[1] R. Picard, S. Trostorff, and M. Waurick On the Well-posedness of a Class of Non-Autonomous SPDEs: An Operator-Theoretical Perspective *GAMM-Mitteilungen* 41(4): e201800014, Applied Operator Theory ? Part II, 2018, `https://arxiv.org/abs/1804.03551`

[2] A. Süß and M. Waurick A Solution Theory for a General Class of SPDEs *Stochastics and Partial Differential Equations: Analysis and Computations*, 5(2): 278-318, 2017 `https://link.springer.com/article/10.1007/s40072-016-0088-8`

[3] C. Seifert, S. Trostorff, and M. Waurick. Evolutionary Equations. ISem 23 Lecture Notes, 2020.