

Workshop in Stochastic Analysis and Applications

IMECC - UNICAMP

July 10th-11th, 2019

Rescaling nonlinear noise for 1D stochastic parabolic equations

Misha Neklyudov

UFAM-Brazil

misha.neklyudov@gmail.com

Abstract

Regularisation by noise of partial differential equations have been an object of intense study for a number of years, see book of Flandoli [1], paper of Flandoli, Gubinelli and Priola [2] and, more recently, review of the literature in Gess, Souganidis [4]. For instance, It was shown in Flandoli, Gubinelli and Priola that the equation

$$du + b(x)\nabla u dt = \partial_x u \circ d\beta_t$$

can be well posed even if the corresponding deterministic equation is not. In the same time, the proof was based on linearity and homogeneity of the noise. Counterexample of nonlinear equation where noise does not improve regularity is given in Flandoli [1]. The effect of regularization by non-linear stochastic perturbations in the setting of stochastic conservation laws has been considered in Gess, Souganidis [4, 5], Gassiat, Gess [3]. In this talk we show how to complement these results in the parabolic setting.

References

- [1] Flandoli, F. Random perturbation of PDEs and fluid dynamic models. Lecture Notes in Mathematics, Vol. 2015. Springer, Heidelberg, 2011.
- [2] Flandoli, F., Gubinelli, M., Priola, E., *Well-posedness of the transport equation by stochastic perturbation*. Invent. Math. **180**, no. 1, 1–53 (2010).
- [3] Gassiat, P., Gess, B., *Regularization by noise for stochastic Hamilton-Jacobi equations*. arXiv: 1609.07074
- [4] Gess, B., Souganidis, Panagiotis E., *Long-time behavior, invariant measures, and regularizing effects for stochastic scalar conservation laws*. Comm. Pure Appl. Math. **70**, no. 8, 1562–1597 (2017).
- [5] Gess, B., Souganidis, Panagiotis E., *Stochastic non-isotropic degenerate parabolic-hyperbolic equations*. Stochastic Process. Appl. **127**, no. 9, 2961–3004 (2017).