OPTIMAL NON-SYMMETRIC FOKKER-PLANCK EQUATION FOR THE CONVERGENCE TO A GIVEN EQUILIBRIUM

A. ARNOLD

Abstract. We are concerned with finding Fokker-Planck equations in whole space with the fastest exponential decay towards a given equilibrium. For a prescribed, anisotropic Gaussian we determine a non-symmetric Fokker-Planck equation with linear drift that shows the highest exponential decay rate for the convergence of its solutions towards equilibrium. At the same time it has to allow for a decay estimate with a multiplicative constant arbitrarily close to its infimum. This infimum is 1, corresponding to the high-rotational limit in the Fokker-Planck drift.

Such an optimal Fokker-Planck equation is constructed explicitly with a diffusion matrix of rank one, hence being hypocoercive. The proof is based on the recent result that the L^2-propagator norms of the Fokker-Planck equation and of its drift-ODE coincide for all time. Finally we give an outlook onto using Fokker-Planck equations with t-dependent coefficients.

This talk is based on joint work with Christian Schmeiser and Beatrice Signorello.

References:

* A. Arnold, B. Signorello: Optimal non-symmetric Fokker-Planck equation for the convergence to a given equilibrium, preprint 2021.

* A. Arnold, C. Schmeiser, B. Signorello. Sharp decay estimates and L^2-propagator norm for Fokker-Planck equations with linear drift, to appear in Comm. Math. Sci., 2022.