

# Fokker-Planck equations with terminal condition and related McKean probabilistic representation

Francesco Russo

<http://uma.ensta-paristech.fr/~russo>

ENSTA Paris, Institut Polytechnique de Paris, France

## Abstract

Stochastic differential equations (SDEs) in the sense of McKean are stochastic differential equations, whose coefficients do not only depend on time and on the position of the solution process, but also on its marginal laws. Often they constitute probabilistic representation of conservative PDEs, called Fokker-Planck equations;

In general Fokker-Planck PDEs are well-posed if the initial condition is specified. Here, alternatively, we consider the inverse problem which consists in prescribing the final data: in particular we give sufficient conditions for existence and uniqueness.

We also provide a probabilistic representation of those PDEs in the form a solution of a McKean type equation corresponding to the time-reversal dynamics of a diffusion process.

The research is motivated by some application consisting in representing some semilinear PDEs (typically Hamilton-Jacobi-Bellman in stochastic control) fully backwardly.

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