

## The $dX(t) = Xb(X)dt + X\sigma(X)dW$ Equation and Financial Mathematics I.

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*Abstract:* The existence of a weak solution and the uniqueness in law are assumed for the equation, the coefficients  $b$  and  $\sigma$  being generally  $C(\mathbb{R}^+)$ -progressive processes. Any weak solution  $X$  is called a  $(b, \sigma)$ -stock price and Girsanov Theorem jointly with the DDS Theorem on time changed martingales are applied to establish the probability distribution  $\mu_\sigma$  of  $X$  in  $C(\mathbb{R}^+)$  in the special case of a diffusion volatility  $\sigma(X, t) = \tilde{\sigma}(X(t))$ . A martingale option pricing method is presented.

*Keywords:* weak solution and uniqueness in law in the SDE-theory;  $(b, \sigma)$ -stock price; its Girsanov and DDS-reduction; investment process; option pricing;

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