

fd_gauss_vasicek1d_capfloor

Input parameters:

- Space StepNumber N_r
- Time StepNumber M

Output parameters:

- Price

The stochastic differential equation representing the short rate is given by

$$dr_t = k(\theta - r_t)dt + \sigma dW(t)$$

The price of the zero-coupon bond with maturity $S > T$ is solution of the following PDE

$$u_t + \frac{1}{2}\sigma^2 u_{rr} + [k(\theta - r)]u_r - ru = 0, u(r, S, S) = 1$$

that we solve using Crank-Nicholson scheme. We apply Dirichlet boundary conditions at $r = r_{min}$ and $r = r_{max}$. The price of the option is obtained solving the same PDE with boundary condition at the maturity of the option T , the price of the Zero Coupon Bond. A cap(floor) is equivalent to a portfolio of European zero-coupon Put(Call)-Options.