fd_gauss_vasicek1d_zbo

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

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

that we solve using explicit scheme of Hull-White[1]. 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. We apply Dirichlet boundary conditions at $r = r_{min}$ and $r = r_{max}$.

References

[1] J.Hull and A.WHITE. Valuing derivative securities using the explicit finite difference method. *Journal of Financial and Quantitative Analysis*, 25:87–100, 1990. 1