

# fd\_limdisc

## 1 Introduction

A barrier option is activated or extinguished when a specified asset price, index, or rates reaches a specified level. Some models of barrier option assume continuous monitoring of the barrier, others specify fixed times for monitoring of the barrier. The price at time  $t$  of an European Call-Down Out option with discret monitoring is solution of the following PDE :

$$\begin{cases} \frac{\partial V}{\partial t} + \frac{\sigma^2 S^2}{2} \frac{\partial^2 V}{\partial S^2} + rS \frac{\partial V}{\partial S} - rV = 0, \\ V(S, T) = (S - K)_+ 1_{l, \infty}(S). \end{cases}$$

with updating of the initial condition at the monitoring dates  $0 = t_0 < t_1 < \dots < t_N = T$

$$V(S, t_i^-) = V(S, t_i) 1_{l, \infty}(S)$$

for  $i = 1, \dots, n$ .

The PDE is solved with standard finite difference method, taking opportunely in account the jump conditions at monitoring dates  $t_i$ .