

## fd\_bcgstab

Input parameters:

- SpaceStepNumber  $N$
- TimeStepNumber  $M$
- Max Iter  $max\_iter$
- Tol  $tol$
- Preconditioner  $precond$

Output parameters:

- Price
- Delta1
- Delta2

**/\*Compress Diagonal Storage\*/**

**/\*Dirichlet Boundary Conditions\*/**

**/\*Memory Allocation\*/**

**/\*Space localisation\*/**

Define the integration domain  $D = [-l, l]^2$  using probabilistic estimation.

**/\*Space Step\*/**

Define the space step  $h = \frac{2l}{M}$ .

**/\*Time Step/\***

**/\*Cds format/\***

**/\*Preconditioners/\***

Diagonal or ILU Preconditioners.

**/\*Terminal Values/\***

Put the value of the payoff into a vector  $P$

**/\*Homegenous Dirichlet Conditions/\***

**/\*Finite difference Cycle/\***

At any time step, described by the loop in the variable *TimeIndex*, we have to solve the linear system with BCGStab Algorithm (cf. [there](#))

**/\*BCGSTAB Algorithm/\***

**/\*Splitting for American case\*/**

For American options, we compare at each time step the solution in  $P$  with the payoff function saved in  $iv$ . We save the result in  $P$

**/\*Price\*/**

**/\*Delta\*/**

**/\*Memory Desallocation\*/**