Source | Model Presentation

sg1d

1 Description

In the quadratic interest rate model [1], the evolution of the spot interest rate $r(t)$ is described by the following SDE :

$$\begin{cases} dx(t) = (\alpha(t) - \beta\, x(t))\, dt + \sigma\, dW(t), \\ r(t) = \dfrac{1}{2} x(t)^2, \\ x(0) = \sqrt{2r(0)}, \end{cases}$$

where :

- β and σ are constants.
- α can be either a constant or a time-dependent function determinated by the values of β, σ and the curve of the s-maturity zero-coupon prices at time $t = 0$.

2 Code Implementation

```
#ifndef _SquaredGaussian1D_H
#define _SquaredGaussian1D_H

#include "optype.h"
#include "var.h"

#define TYPEMOD SG1D

/*1D  SquaredGaussian World*/
typedef struct TYPEMOD
{
```

```
  VAR T;
  VAR flat_flag;
  VAR a;
  VAR Sigma;
} TYPEMOD;

extern double MOD(GetYield)(TYPEMOD *pt);
extern char *MOD(GetCurve)(TYPEMOD *pt);

#endif
```

References

[1] F.Jamshidian. Bond,futures and option evaluation in the quadratric interest rate model. *Applied Mathematical Finance*, 3:93–115, 1996. 1