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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 :

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

where :

- β and σ are constants.
- α can be either a constant or a time-dependent function determined 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 quadratic interest rate model. *Applied Mathematical Finance*, 3:93–115, 1996. 1