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```
#ifndef _DUP1D_STD_H
#define _DUP1D_STD_H

#include "dup1d.h"
#include "std.h"

#include "mathtools.h"
#include "random.h"
#include "numfunc.h"
#include "transopt.h"
#include "linsys.h"
#include <float.h>

/* Local Volatility Examples Sigma(t,x) */
static double volatility(double t, double x,int
    sigma_type)
{
    double val;

    if(sigma_type==0)
    {
        val=15./x;
    }

    else if(sigma_type==1)
    {
        val=0.01+0.1*exp(-x/100)+0.01*t;
    }

    if (val>=1.) val=1.;
    else if (val<=0.01)
        val=0.01;

    return val;
}

/* First Order Derivatives Sigma(t,x) for Adaptiv
   e Method*/
static double volatility_x(double t, double x,
    int sigma_type)
```

```
{
    double val;

    if(sigma_type==0)
    {
        val=-15./SQR(x);
    }
    else if(sigma_type==1)
    {
        val=-0.1/100.*exp(-x/100.);
    }

    return val;
}

/* Second Order Derivatives Sigma(t,x) for Adaptive Method */
static double volatility_xx(double t, double x,
    int sigma_type)
{
    double val;

    if(sigma_type==0)
    {
        val=30./CUB(x);
    }
    else if(sigma_type==1)
    {
        val=0.1/(100.*100.)*exp(-x/100.);
    }

    return val;
}

#endif
```

## References