

## [Help](#)

```
#include <stdlib.h>
#include "
href../../mod/mer1d/mer1d_std/mer1d_std_h_src.pdfmer1d_std.h"
#include "
href../../common/enums_h_src.pdfenums.h"

#if defined(PremiaCurrentVersion) && PremiaCurrentVersion < (2007+2) //The "#els
static int CHK_OPT(FD_ImpExp)(void *Opt, void *Mod)
{
    return NONACTIVE;
}
int CALC(FD_ImpExp)(void *Opt, void *Mod, PricingMethod *Met)
{
    return AVAILABLE_IN_FULL_PREMIA;
}
#else

static int asym_1d(int am, PARAM p, DENSITY g, MESH m, WEIGHT w, IMESH Im, NumFu
{

    int j, i;
    double integral, *weight, *sol_a, *sol_b, *p1, *p2, *p3, *tnoto, *boundary, *O

    /* vector allocation */
    sol_a = malloc(m.N * sizeof(double));
    if (sol_a == NULL) return MEMORY_ALLOCATION_FAILURE;
    Obst = malloc(m.N * sizeof(double));
    if (Obst == NULL) return MEMORY_ALLOCATION_FAILURE;
    memset(sol_a, 0, m.N * sizeof(double));
    sol_b = malloc(m.N * sizeof(double));
    if (sol_b == NULL) return MEMORY_ALLOCATION_FAILURE;
    memset(sol_b, 0, m.N * sizeof(double));
    tnoto = malloc(m.N * sizeof(double));
    if (tnoto == NULL) return MEMORY_ALLOCATION_FAILURE;
    memset(tnoto, 0, m.N * sizeof(double));
    p1 = malloc(m.N * sizeof(double));
    if (p1 == NULL) return MEMORY_ALLOCATION_FAILURE;
    memset(p1, 0, m.N * sizeof(double));
    p2 = malloc(m.N * sizeof(double));
```

```

if (p2 == NULL) return MEMORY_ALLOCATION_FAILURE;
memset(p2, 0, m.N * sizeof(double));
p3 = malloc(m.N * sizeof(double));
if (p3 == NULL) return MEMORY_ALLOCATION_FAILURE;
memset(p3, 0, m.N * sizeof(double));
weight = malloc(Im.N * sizeof(double));
if (weight == NULL) return MEMORY_ALLOCATION_FAILURE;
memset(weight, 0, Im.N * sizeof(double));
boundary = malloc(m.N * sizeof(double));
if (boundary == NULL) return MEMORY_ALLOCATION_FAILURE;
memset(boundary, 0, m.N * sizeof(double));

/* set integral weights */
d1_intcomp(Im.N, m.h, weight, g.d, SIMP);

/* Terminal Values */
for (j = 0; j < m.N; j++) /* opt = 1 call option; opt=0 put option */
{
    sol_a[j] = (p_func->Compute)(p_func->Par, exp(m.xmin + j * m.h));
    Obst[j] = sol_a[j];
}
/* set boundary */
set_boundaryAA(bound, m, p, Im, sol_a, boundary);

/* "Probabilities" associated to points */
for (j = 0; j < Im.min; j++)
{
    p1[j] = 0.;
    p2[j] = 1.0;
    p3[j] = 0.;
}
for (j = Im.min; j < Im.max; j++)
{
    p1[j] = -m.k / 2.*w.p1;
    p2[j] = 1.0 + m.k / 2.*w.p2;
    p3[j] = -m.k / 2.*w.p3;
}
for (j = Im.max; j < m.N; j++)
{
    p1[j] = 0.;
    p2[j] = 1.0;

```

```

    p3[j] = 0.;
}
/* Finite Difference Cycle */
for (i = 1; i <= m.M; i++)
{
    for (j = 0; j < Im.min; j++)
    {
        tnoto[j] = boundary[j]; /* boundary */
    }
    for (j = Im.max; j < m.N; j++)
    {
        tnoto[j] = boundary[j]; /* boundary */
    }
    for (j = Im.min; j < Im.max; j++)
    {
        integral = calc_int(Im.N, weight, &sol_a[j - Im.min]);
        tnoto[j] = m.k / 2.*w.p1 * sol_a[j - 1] + (1.0 - m.k / 2.*w.p2) * sol_
    }
    /* tridiagonal system */
    tridiagsystem(p1, p2, p3, tnoto, sol_b, m.N);

    for (j = 0; j < m.N; j++)
    {
        sol_a[j] = sol_b[j];

        if (am)
            sol_a[j] = MAX(Obst[j], sol_a[j]);
    }
}

/* Price */
*ptprice = sol_a[m.Index];
/*Delta*/
*ptdelta = (sol_a[m.Index + 1] - sol_a[m.Index - 1]) / (2.0 * p.s * m.h);

/* Memory Desallocation */
free(sol_a);
free(sol_b);
free(weight);
free(p1);
free(p2);

```

```

    free(p3);
    free(tnoto);
    free(boundary);
    free(Obst);

    return RETURNOK;
}

static int ImpExp(int am, double s, NumFunc_1 *p_func, double t, double r, double
{
    MESH m;
    WEIGHT w;
    IMESH Im;
    PARAM p;
    DENSITY g;
    EQ eq;
    double K;

    K = p_func->Par[0].Val.V_DOUBLE;
    Gaussian_data(mu, gamma2, &g);
    set_parameter(s, K, t, r, sigma, divid, lambda, g.Eu, &p);
    equation(p, &eq);

    if (N % 2 == 1) N++;

    initgrid_1Dbis(p, g, eq, N, &m, &Im);
    set_weights_impl(M, p.T, eq, &m, &w);
    Gaussian_vect(0, Im.N, m.h, &g);
    asym_1d(am, p, g, m, w, Im, p_func, bound, ptpprice, ptdelta);

    freeDensity(&g);

    return OK;
}

int CALC(FD_ImpExp)(void *Opt, void *Mod, PricingMethod *Met)
{
    TYPEOPT *ptOpt = (TYPEOPT *)Opt;
    TYPEMOD *ptMod = (TYPEMOD *)Mod;
    double r, divid;

```

```

    r = log(1. + ptMod->R.Val.V_DOUBLE / 100.);
    divid = log(1. + ptMod->Divid.Val.V_DOUBLE / 100.);

    return ImpExp(ptOpt->EuOrAm.Val.V_BOOL, ptMod->S0.Val.V_PDOUBLE,
                  ptOpt->PayOff.Val.V_NUMFUNC_1, ptOpt->Maturity.Val.V_DATE - ptMo
}

static int CHK_OPT(FD_ImpExp)(void *Opt, void *Mod)
{
    return OK;
}
#endif //PremiaCurrentVersion

static int MET(Init)(PricingMethod *Met, Option *Opt)
{
    if (Met->init == 0)
    {
        Met->init = 1;
        Met->HelpFilenameHint = "FD_ImpExp_mer";

        Met->Par[0].Val.V_INT2 = 2000;
        Met->Par[1].Val.V_INT2 = 100;
        Met->Par[2].Val.V_ENUM.value = 0;
        Met->Par[2].Val.V_ENUM.members = &PremiaEnumBoundaryCond;

    }

    return OK;
}

PricingMethod MET(FD_ImpExp) =
{
    "FD_ImpExp",
    { {"SpaceStepNumber", INT2, {500}, ALLOW},
      {"TimeStepNumber", INT2, {100}, ALLOW},
      {"Boundary Condition", ENUM, {1}, ALLOW},
      {" ", PREMIA_NULLTYPE, {0}, FORBID}
    },

```

```

CALC(FD_ImpExp),
{ {"Price", DOUBLE, {100}, FORBID},
  {"Delta", DOUBLE, {100}, FORBID},
  {" ", PREMIA_NULLTYPE, {0}, FORBID}
},
CHK_OPT(FD_ImpExp),
CHK_split,
MET(Init)
};

```