fourier_carr_madan

February 26, 2019

In [1]:
```
import numpy as np
from scipy.integrate import quad

from contract_v01 import VanillaOption
from sde_1d_v01 import Gbm_1d
```

In [2]:
```
'''===============
Test bsm_price
=================='''

gbm1 = Gbm_1d(init_state=100., drift_ratio=.0475, vol_ratio=.2)
option1 = VanillaOption(otype = 1, strike = 110., maturity= 1., market_price=15.)

print('>>>>>>>>>>call value is ' + str(gbm1.bsm_price(option1)))
```

```
>>>>>>>>>>call value is 5.943273183452838
```

In [3]:
```
'''========
paras
============'''
s0 = 100
r = .0475
sigma = .2
otype = 1
K = 110.
T = 1.
```

In [4]:
```
log_s0 = np.log(s0)
log_k = np.log(K)
mu = r - .5*sigma**2

alpha = 1
```

In [5]:
```
char_fun = lambda u: np.exp(1j*u*(log_s0+mu*T) - .5*(sigma**2)*T*(u**2))
psi = lambda nu: (np.exp(-r*T)*char_fun(nu-(alpha+1)*1j))/(alpha**2+alpha-nu**2+1j*(2*al
integrand = lambda nu: (np.exp(-1j*nu*log_k)*psi(nu)).real
```

In [6]:
```
call = quad(integrand, 0, np.inf)[0]*np.exp(-alpha*log_k)/np.pi
```

```
In [7]: call
```

```
Out[7]: 5.943273183452849
```