fangoosterlee Documentation

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Stanislav Khrapov

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Contents

The method comes from *[R1]*

The original code is found at http://www.wilmott.com/messageview.cfm?catid=34&threadid=78554

CHAPTER 1

References

fangoosterlee.cosmethod.**cosmethod**(*model*, *moneyness=0.0*, *call=True*, *npoints=1024*)

COS method.

Parameters **model** : instance of specific model class

The method depends on availability of two methods:

- charfun
- cos_restriction

moneyness : array_like

Moneyness of the option, np.log(strike/price) - riskfree * maturity

call : bool array_like

Call/Put flag

npoints : int

Number of points on the grid. The more the better, but slower.

Returns array_like

Option premium normalized by asset price

Notes

charfun method (risk-neutral conditional chracteristic function) of *model* instance should depend on one argument only (array_like) and should return array_like of the same dimension.

cos_restriction method of *model* instance takes *maturity* and *riskfree* as array arguments, and returns two corresponding arrays (a, b).

CHAPTER 2

Inverse of characteristic function

Read Carr & Madan (1999) for idea of derivation

`fangoosterlee.cfinverse.`**`cfinverse`**(*psi*, *alim=-100000.0*, *blim=100000.0*, *points=100000.0*)

Discrete Fourier inverse.

Inverts characteristic function to obtain the density.

Parameters **psi** : function

Characteristic function dependent only on u

alim : float, optional

Lower limit of integration

blim : float, optional

Upper limit of integration

points : int, optional

Number of discrete points for evaluation

Returns **grid** : (points,) array

Domain of the resulting density

density : (points,) array

Density values

Bibliography

[R1] Fang, F., & Oosterlee, C. W. (2009). A Novel Pricing Method for European Options Based on Fourier-Cosine Series Expansions. *SIAM Journal on Scientific Computing*, 31(2), 826. doi:10.1137/080718061 <http://ta.twi.tudelft.nl/mf/users/oosterle/oosterlee/COS.pdf>

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