

## cf\_put\_heston

This model is given by,

$$\begin{aligned}dS_t &= rS_t dt + \sqrt{v_t} S_t dW_t^1, \\dv_t &= k(\theta - v_t)dt + \sigma\sqrt{v_t}dW_t^2,\end{aligned}$$

where  $W^1$  and  $W^2$  are two correlated brownian motions with  $\langle W^1, W^2 \rangle_t = \rho t$ , and  $k$ ,  $\theta$  and  $\sigma$  are constants. In the case of a European call option, Heston guessed a solution of the form

$$C(S, v, t) = SP_1 - Ke^{-r(T-t)}P_2,$$

by analogy with the Black-Scholes formula. The first term in this formula is the present value of the spot price while the second term is the present value of the strike-price payment.

Using this model, Heston has given a closed form solution to the pricing of a European call option by the characteristic functions technique. For more details one can see [\[1\]](#)

## References

- [1] S.L.HESTON. A closed-form solution for options with stochastic volatility with applications to bond and currency options. *Review of Financial Studies*, 6(2):327–343, 1993. [1](#)