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cf_put_heston

This model is given by, $dS_t = rS_t dt + \sqrt{v_t}S_t dW_t^1$,
 $dv_t = k(\theta - v_t)dt + \sigma\sqrt{v_t}dW_t^2$, where W^1 and W^2 are two correlated brownian
 motions with $\langle W^1, W^2 \rangle_t = \rho t$, and k, θ and σ are constants. Discretizing
 with an *Euler scheme* leads to $S_{T_{i+1}} = S_{T_i}(1 + r\Delta t + \sqrt{\sigma_i}\Delta t Z_i)$,
 $v_{T_{i+1}} = v_{T_i} + k(\theta - v_{T_i})\Delta t + \sigma\sqrt{\Delta t v_{T_i}}(\rho Z_i + \sqrt{1 - \rho^2}Z_{m+i})$, where $(Z_i)_{i \geq 1}$
 is a sequence of independent Gaussian variables with mean 0 and variance 1.
 In our implementations we have taken the stochastic input to model to be
 the single vector (Z_1, \dots, Z_{2m}) . In some respects, it might be more natural
 to think of two separate vectors, each of length m .
 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