

# Fast Fourier Transform, American Option Approximation, and Daily Price Limit

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# Contributions

- The paper extends the intraday characteristic function of the logarithmic stock price as in [Guo and Chang(2020)] to a multi-day counterpart, given the parameters  $\vartheta, \sigma, \alpha$  and  $\beta$ .
- The derived characteristic functions are from a system of SDEs governing the stock price, but with two extra parts to enforce the lower and upper price bound.

# Contributions

- According to [Carr and Madan(1999)], the FFT can be used to price (European) options once the characteristic function of the logarithmic price is obtained.
- It is shown in the paper that, with  $\alpha > 1$ , the EEP of an American option can be approximated by FFT as well. The formulas for the cases of two & three early exercise time points are presented.

# Contributions

- In a simulation exercise, it is tested that the proposed method has a consistent pricing performance with MC (for European style) and LSMC (for American style), but a great advantage in terms of the computational time.
- A sensitive analysis shows that a more restrictive daily stock price limit can trigger an earlier exercise boundary. But when the price limit is greater than 10%, the marginal influence is becoming small.

# Comments

- In the simulation analysis, can we also consider a calibration exercise?  
e.g. estimate the parameters from simulated option prices.
- Also, it can be better if the simulation admits noises.
- It would be interesting to see some empirical investigation with real option data, where, probably the in-sample and out-of-sample performance can be evaluated as well.

# Comments

- Overall, it is a fantastic paper, with interesting and solid option pricing methodology. All the best for the publication!

# References I



Carr, P., Madan, D., 1999.

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