**Geometric Asian Call Option Pricing using the Heston Model**

**Overview**

This MATLAB project implements the pricing of a fixed-strike geometric Asian call option under the Heston model using Fourier inversion techniques and the joint characteristic function. The script computes option prices for various strike prices, maturities, and truncation values, and stores the results in an Excel file.

**Features**

* Implements the Heston model for stochastic volatility.
* Uses Fourier inversion for efficient pricing.
* Computes option values for different strikes and maturities.
* Exports results to an Excel file.

**Files**

* mainFinal.m: The main script that executes the option pricing.
* GeometricAsianCallTable.xlsx: Output file containing computed option prices and execution times.

**Prerequisites**

* MATLAB (any recent version should work)
* Basic understanding of options pricing and the Heston model

**Usage**

1. Open MATLAB and navigate to the directory containing mainFinal.m.
2. Run the script:
3. mainFinal
4. The script will compute option prices for various parameter combinations and display the results.
5. The results will also be saved in GeometricAsianCallTable.xlsx.

**Parameters**

The following key parameters are used in the script:

* S0 = 100: Initial stock price
* v0 = 0.09: Initial variance
* r = 0.05: Risk-free rate
* theta = 0.348: Long-run variance
* sigma = 0.39: Volatility of variance
* kappa = 1.15: Rate of mean reversion
* rho = -0.64: Correlation between asset and variance
* K = [90, 100, 110]: Strike prices
* T = [0.5, 1.0, 2.0]: Option maturities
* n\_values = [10, 20, 30]: Truncation levels for Fourier inversion
* upper\_bound = 1e5: Upper limit for numerical integration

**Output**

The script outputs:

* Option prices for different K, T, and n\_values
* Execution time for each computation
* Data saved in GeometricAsianCallTable.xlsx

**Functions**

* mainFinal(): Main function that iterates over parameters and computes option prices.
* compute\_asian\_price(): Computes option price using Fourier inversion.
* compute\_H\_Htilde(): Computes auxiliary functions needed for characteristic function evaluation.

**License**

This project is provided for academic and educational purposes. Modify and use it as needed for research and experimentation.

**Contact**

For any questions or improvements, feel free to reach out!