Two Asset-Barrier Option under Stochastic Volatility

Financial products which depend on hitting times for two underlying assets have become very popular in the last decade. Three common examples are: double-digital barrier options, two-asset barrier spread options and double lookback options. Analytical expressions for the joint density/distribution of the endpoints and maximum and/or minimum values of two assets are essential in order to obtain closed-form solutions for the price of these derivatives. He et al. (1998) [17] and Zhou (1997, 2001) [34],[35] derived closed-form pricing expressions in the context of constant volatility and correlation. Due to the overwhelming evidence accumulated since the eighties of non constant covariances among stock prices, we introduce a third stochastic factor to the geometric Brownian model governing the covariance and derive closed-form expressions for some two-asset barrier options.