Expansion formulas for average and spread options

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Abstract:
Financial contracts in energy markets are often written in terms of average or spread of different assets: for instance, call option on the average of daily delivering forward contracts, clean spark spread based on gas, electricity and carbon. Even in log-normal models, deriving closed analytical formulas is out of reach and several approximations are known, due to Kirk 1995, Carmona-Durrleman 2003, Bjerksund-Stensland 2006, Alos-Eydeland-Laurence 2011. We propose improvements of these approximations and we extend them to general local volatility models, using a proxy approach. It leads to explicit and tractable approximation formulas which accuracy are very good on realistic examples.