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path integral approach to closed form pricing formulas in the Heston framework. DAMIAAN LEMMENS, MICHEL WOUTERS, JACQUES TEMPERE, Universiteit Antwerpen, SVEN FOULON, KBC Bank, TFVS TEAM — We present a path integral approach for finding closed form formulas for option prices in the framework of the Heston model. The first model for determining option prices was the Black-Scholes model, which assumed that the logreturn followed a Wiener process with a given drift and constant volatility. To provide a realistic description of the market, the Black-Scholes results must be extended to include stochastic volatility. This is achieved by the Heston model, which assumes that the volatility follows a mean reverting square root process. Current applications of the Heston model are hampered by the unavailability of fast numerical methods, due to a lack of closed-form formulae. Therefore the search for closed form solutions is an essential step before the qualitatively better stochastic volatility models will be used in practice. To attain this goal we outline a simplified path integral approach yielding straightforward results for vanilla Heston options with correlation. Extensions to barrier options and other path-dependent option are discussed, and the new derivation is compared to existing results obtained from alternative path-integral approaches (Dragulescu, Kleinert).

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