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The main objective of this work is to calculate the Greeks of European style option contracts in finance using the Malliavin calculus when the market is modelled by an exponential Variance Gamma process. In order to do that we evaluate the corresponding Malliavin weight in Poisson-Wiener space. We measure the performance of the results of this approach in terms of the analytical results that we obtained by the inverse Fourier transform method. Also, we compare the results of Malliavin approach with the usual finite difference method. We observe a better convergence in the Malliavin approach especially for options with discontinuous payoff.

**Key words:** Malliavin calculus, Monte-Carlo simulations, Variance Gamma process, sensitivity analysis, Fast Fourier Transform methods. (Received September 22, 2009)