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Approximate formulae for evaluation of expectations of random functionals based on chaotic development with respect to multiple Ito integrals

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The report is devoted to numerical evaluation of mathematical expectations of functionals defined on trajectories of stochastic processes. Our approach is to use quadrature formulas exact for functional polynomials of the trajectories of the process, as it was considered in [1,2]. Construction of this type of formulas is strongly dependent on way of giving the stochastic process. In [1,2] the quadrature formulas are built in the cases where the characteristic functional of the process is known in explicit form. Some results are received in the cases where the process is the solution of Ito stochastic differential equation [1-3]. Application of chaotic expansions of one class of functionals defined on the trajectories of Gaussian processes with respect to functional Hermite polynomials is considered in [4]. In this report we use chaos expansion with respect to multiple Ito integrals to construct quadrature formulae for calculating of nonlinear functionals of one class of stochastic Levy process containing continuous and discontinuous components. The formula is exact for symmetric functional polynomial of third degree, so we use in the construction the product formula of multiple Levy-Ito integrals [5].

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