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ON MULTIPLE POISSON STOCHASTIC INTEGRALS AND ASSOCIATED MARKOV SEMIGROUPS

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Abstract: Multiple stochastic integrals (m.s.i.)

$$q^{(n)}(f) = \int_{X_n} f(x_1, \ldots, x_n) q(dx_1) \ldots q(dx_n), \quad n = l, 2, \ldots$$

with respect to the centered Poisson random measure $q(dx)$, $E[q(dx)] = 0$, $E[(q(dx))] = m(dx)$, are discussed, where (X, m) is a measurable space. A "diagram formula" for evaluation of products of (Poisson) m.s.i. as sums of m.s.i. is derived. With a given contraction semigroup A_t, $t \geq 0$, in $L^2(X)$ we associate a semigroup $\Gamma(A_t)$, $t \geq 0$, in $L^2(\Omega)$ by the relation

$$\Gamma(A_t) q^{(n)}(f_1 \hat{\otimes} \ldots \hat{\otimes} f_n) = q^{(n)}(A_t f_1 \hat{\otimes} \ldots \hat{\otimes} A_t f_n)$$

and prove that $\Gamma(A_t)$, $t \geq 0$, is Markov if and only if A_t, $t \geq 0$, is doubly sub-Markov; the corresponding Markov process can be described as time evolution (with immigration) of the (infinite) system of particles, each moving independently according to A_t, $t \geq 0$.

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