Doobko V. A (Kiev, Ukraine). **Natural invariants and elements of a stochastic mechanics.**

The requirement of existence and uniqueness of a solution of the dynamic equation, at certain requirements to smoothness of factors, leads to occurrence of an integral invariant:

$$\int_{\mathrm{R}^n} \rho_l(x;t)d\Gamma(x) = \int_{\mathrm{R}^n} \rho_l(x)d\Gamma(x) = 1, \forall t \geq 0, \rho_l(x) \geq 0, \forall x \in \mathrm{R}^n; d\Gamma(x) = \prod_{j=1}^{n} dx_j.$$

$\rho_l(x;t)$ carries a title of the dynamic kernel of an integral invariant.

The number of such independent kernels$\rho_l(x;t)$, is no more n+1.

Let be $x(t;x(0))$- the solution of the classical stochastic differential equations. The equations for kernels can be constructed, considering rules of stochastic differentiation of Ito, of the generalised formula of Ito-Wenttsell, and the requirement:

$$d_t\rho_l(x(t;x(0));t)J(t) = 0, J(t) = J(t;x(0)), \forall t \geq 0, \forall x(0) in \mathrm{R}^n$$

where the $J(t)$ - Jacobian of transformation connected with dynamic process $x(t;x(0)) \in \mathrm{R}^n$

We can check up that a $\rho_l(x;t)/\rho_k(x;t) = u_{l,k}(x;t)$ is stochastic first integral.

The additional restriction connected about the requirement that existence the Poincares integral invariant, leads to the stochastic equations of Hamilton.

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