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Review text:

Let (X, σ), (Y, μ) be two measure spaces. Consider a Poisson process on X with mean measure σ. For a function $u(\omega, x)$ of the sample configuration ω of the process and the point $x \in X$, the Skorohod integral operator maps u into the real number

$$\delta_\sigma(u) := \int_X u(\omega \setminus \{t\}, t)\ (\omega(dt) - \sigma(dt)),$$

where $\omega \setminus \{t\}$ is the configuration obtained from ω by removing the point t if the latter belongs to ω. Let R be a random isometry between the space of p-integrable functions on X and p-integral functions of Y. This paper is concerned with an expression for the moments of $\delta_\sigma(Rh)$ for appropriate functions h. This expression is used for the short proof of a sufficient condition for the preservation of the Poisson property under random transformations. Specifically, let $\tau(\omega, \cdot)$ be a map from X into Y such that, for each ω, the image of σ under this map is μ. We apply this map to the atoms $(x_i(\omega))$ of a point process ω on X to obtain a point process with atoms $(\tau(\omega, x_i(\omega)))$ on Y. Suppose ω is Poisson with mean measure σ. Then the image process is Poisson with mean measure μ if the following (sufficient only) condition is satisfied: the k-tuples $\big(\tau(\omega \cup \{t_1\}, t_2),\ \tau(\omega \cup \{t_2\}, t_3), \ldots, \tau(\omega \cup \{t_{k-1}\}, t_k),\ \tau(\omega \cup \{t_k\}, t_1)\big)$ and $\big(\tau(\omega, t_2),\ (\tau(\omega, t_3), \ldots, (\tau(\omega, t_k),\ (\tau(\omega, t_1)\big)$ have at least one common component, for all k, all ω, and all $t_1, \ldots, t_k \in X$.

The paper is a short version of another paper by the same author, N. Privault (2010), invariance of Poisson measures under random transformations, arXiv:1004.2588v1, where complete proofs of all results are given.