FUNCTIONAL LIMIT THEOREMS FOR MULTIDIMENSIONAL GENERALIZED LÉVY WALKS

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In this work we present the functional limit theorems for multidimensional generalized Lévy Walk process, which is a generalization of classical Lévy process introduced by Shlesinger, Klafter and Wong [1]. In fact the considered process is a generalization of classical uncoupled CTRW, which was introduced by Scher and Montroll [2]. It corresponds to the stochastic scheme, in which every heavy-tailed waiting time is followed by a step with length being coupled by power-law dependence with the length of preceding waiting time.

The general form of the functional limit was obtained recently [3, 4]. We extend these results by giving the complete description of the limiting process. Namely, it appears that the functional limit process is a subordinated process and we characterize the dependence structure between the external process and the subordinator by means of their join Lévy measure. Depending on the power-law exponent of power-law dependence between the length of waiting time and the length of corresponding jump length in the underlying generalized Lévy Walk process, we result (in functional limit) in subordinated processes consisting of the external processes and subordinators being or independent, or strongly dependent. We also present an approximation scheme for the limiting processes. Results were partially published in [5].

References

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