

## Mean value formulae of one-dimensional stationary line-segment processes

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### Abstract

Random processes of line segments embedded in  $\mathbf{R}^2$  and  $\mathbf{R}^3$  have been studied for a number of physical applications, e.g. for the fiber structure of papers and textiles. Pioneers such as Coleman, Parker and Cowan had considered a model for random line-segment process in  $\mathbf{R}^2$  which makes very weak assumptions concerning the stationarity and isotropy only in the 1970's. This paper studies the parallel model for a line-segment process in  $\mathbf{R}^1$ . Mean value formulae for geometric variables are derived, relying only on very mild stationarity assumption. When interpreting  $\mathbf{R}^1$  as the time axis, the one-dimensional line-segment process is actually a natural generalization of the stationary point process: for which an event occurs not just at a single time point, but may exist for a certain period. The model can thus be applied in modelling the occurrence and existence of some natural phenomena.

Key Words: Stochastic process, stationary point process, stochastic geometry