Abstract of the Phd thesis
Estimation of parameters of inhomogeneous gamma processes
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Inhomogeneous gamma processes with power (MPLP) and log-linear (MGP) trend functions are three-parameter stochastic point process models that are used to describe the times of occurrence of a recurring events.
This dissertation presents the problem of estimating the parameters of the above-mentioned processes. Particular attention is paid to the estimators obtained by the maximum likelihood method. Apart from describing the form of given estimators, theorems about their existence and asymptotic properties were given. As an alternative to the maximum likelihood method, estimators derived from the properties of inhomogeneous gamma processes are presented. Selected estimators of MPLP process parameters, known from the literature, are discussed and, using analogous to the MPLP properties of the MGP, new estimatorsof the MGP were proposed. It has been shown that the estimators obtained using the method of moments or the method of least squares should not be used in the cases considered. Moreover, two new estimation methods were also proposed.
The accuracy of the estimators considered, for selected sets of parameters of MPLP and MGP processes, was compared using computer simulations. In some cases, depending on the parameters and process, better estimates were obtained, according to the selected criteria, using the proposed estimators than using the maximum likelihood estimators. The differences in accuracy were mostly observed for realizations of processes with a small number of jumps.
The dissertation ends with applying estimators considered to real data analysis. Realizations of asymptotically pointwise confidence intervals for the values of unknown model parameters were determined on the basis of the asymptotic properties of the maximum likelihood estimators.