Optimization of repairable systems' accelerated testing

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The paper presents a method of planning the forced tests of repairable systems. By this method estimates dispersion of regression model parameters can be optimized, the model simulates dependence of intensity of the flow of failures on the loading factors. Flow of failures of a technical system is non-homogeneous Poisson process with power-law dependence of the intensity of the flow of time (model Crowe). Loading factors affect only the scale parameter of the model, the shape parameter remains unchanged. Estimates of the parameters were calculated by the maximum likelihood method, estimates of variance approach their asymptotic values by conversing the observed Fisher matrix. Parameters for which the tests optimization is carried out are the total number of shares of products at each stage of the test. In case the number of test steps is arbitrary then generalized variance of the model estimates (the determinant of the covariance matrix estimates) is optimized. In the particular case — for the two test stages — we obtain exact expressions for the parameters that optimize both generalized dispersion and dispersion estimates for each parameter. In all cases, a necessary condition is the equality test duration of tests at different stages.

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