

DETERMINATION OF PARAMETERS OF THE WEIBULL DISTRIBUTION BY APPLYING THE METHOD OF LEAST SQUARES

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UDC:629.3.027.484;519.213.2

ABSTRACT: Weibull distribution is one of the most frequently used theoretical models for approximation of empirical distributions of random variables with continuous variation. Procedures for graphical, grapho-analytical and analytical determination of Weibull distribution parameters are described in detail in this paper. Based on the graphical method for determining the position parameters of three-parameter Weibull distribution, the analytical procedure is developed, which is based on the application of the method of least squares. The set of points is approximating with the square parabola, and based on the sign of the second derivative, the information for further proceedings is obtained. For the defined procedure, an algorithm of the computer program for determination of the Weibull distribution parameters is presented in paper. By using the program, based on data from the exploitation related to the operation time until failure, the reliability modelling of wheel's drum in braking system of light commercial vehicles was performed. The graphical and non-parametric tests were used to test the theoretical model of distribution.

KEY WORDS: Weibull distribution, the method of least squares, computer software determination, reliability of wheel's drum

ODREĐIVANJE PARAMETARA VEJBULOVE RASPODELE PRIMENOM METODE NAJMANJIH KVADRATA

REZIME: Vejbulova raspodela je jedan od najčešće korišćenih teorijskih modela za aproksimaciju empirijskih raspodela slučajnih promenljivih sa kontinualnom promenom. U radu su detaljno opisani postupci za grafičko, grafoanalitičko i analitičko određivanje parametara Vejbulove raspodele. Na osnovu grafičkog postupka za određivanje parametra položaja Vejbulove troparametarske raspodele, razvijen je analitički postupak, koji se zasniva na primeni metode najmanjih kvadrata. Skup tačaka se aproksimira kvadratnom parabolom i na osnovu znaka drugog izvoda dobija se informacija za dalji tok postupka. Za navedeni postupak u radu je dat algoritam programa za kompjutersko određivanje parametara Vejbulove raspodele. Primenom programa, na osnovu podataka iz eksploatacije o vremenu rada do otkaza, izvršeno je modeliranje pouzdanosti doboša točka sistema za kočenje lakih privrednih vozila. Za testiranje teorijskog modela raspodele korišćeni su grafički i neparametarski testovi.

KLJUČNE REČI: Vejbulova raspodela, metoda najmanjih kvadrata, programsko određivanje pomoću računara, pouzdanost doboša točka.

¹ Received: November 2014, Accepted December 2014, Available on line January 2015