Rusev V. N., Skorikov A. V. (Moscow, Russia) — **Renewal function for Weibull - Gnedenko underlying lifetime distribution and operating costs management strategy.**

It is assumed that the lifetime systems objects is described by the two-parameter Weibull-Gnedenko distribution. Analytical and numerical approaches obtained in [1] for the renewal density, are proposed for approximations of the renewal function $H(t)$. Some relations and algorithms for renewal function are applied to the maintenance strategy known as the "block replacement policy (BRP)"[2]. The average cost of operating costs per unit of time is considered as the criterion of optimality: $R(t) = (C_p(1 + c_o H(t))/t$, where $c_o = C_f/C_p$ - the cost factor, C_p - the average cost of preventive maintenance, C_f - the average cost of recovery on failure ($C_p < C_f$). Local minimum point of function $R(t)$ gives corresponding value of the optimal maintenance time t_p. It is known that for extremum point t_0 be realized $R(t_0) = C_f H'(t_0) = C_f h(t_0)$, i.e. value of the function $R(t_0)$ is determined by the renewal density $h(t_0)$. Moreover, it can be shown that $R''(t_0) = t_0^2 C_f H''(t_0)$, which implies that the convexity character of the function $R(t)$ at the extremum coincides with the convexity character of the renewal function $H(t)$ and oscillation of the renewal function correlate with the oscillation of the average cost of operating costs.

A sufficient condition for the existence of the minimum $R(t)$ is the following $c_o > 2/(1 - (CV)^2)$, where $(CV)^2 = \sigma^2/\mu^2$ - is the square of the coefficient of variation (CV). An example shows that the condition is not a necessary condition is given.

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