A simulative trial method based on multi factor coupling is proposed in this paper. In this method, these factors are classified as original factors, cumulative service factors and non cumulative service factors. The states of mechanism are classified as original state and working state. The performance function of mechanism is firstly constructed. In the simulative process, original factors taken as random variables are sampled, and then be substituted into the performance function to get the trial samples. With respect to one of the trial samples, at each moment of the trial sample 's life cycle, non cumulative service factors taken as random variables are sampled, and based on which the cumulative service factors can be computed. Then the sample point of service factors is substituted into the trial sample and we can compute the performance function 's value. If the value is non – negative, go on the simulation process. If the trial sample can be regard as failed, record its life and go on the simulation of next trial sample. As mentioned above, we can get the life of every trial sample. The reliability and the reliability evolution process of the mechanism can be assessed based on the simulation work above. At last, the gear door lock of an airplane is taken as example to illustrate the effect of the proposed method. The method is suitable for other mechanical product of the similar kinds.

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