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The problem of optimal parametric synthesis of engineering systems with the account of random parametric deviations is considered. As a criterion of parametric optimization, a deterministic criterion based on the calculation of the shortest distance to the boundary of the acceptance region is applied. A solution of the problem is proposed, based on genetic algorithm with integer variables and the specified optimization criterion as a fitness function.

**Keywords:** computer-aided design, parametric reliability, optimization, genetic algorithm.

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