It is well known that the stability of a solution is determined by the behavior of the neighboring solutions. In the linear case the stability a solution implies the stability of all solutions. It is not true for nonlinear system.

Most often the examination the trivial solution for example is reduced to investigate the behavior of the solutions with enough small initial values. From the practical point of view such information without measure of neighborhood - called in literature as stability domain - is not enough. It is interesting to know the magnitude of neighborhood because this quantity determines the resistance of motion on disturbances. Unfortunately, in the most cases the exact determining the stability domain is not possible even for nonlinear system with one-degree-of-freedom. So the one possibility remains - the estimation of the stability domain called the guaranteed stability domain (GSD). In the asymptotic stability this estimation is known as guaranteed attraction domain.

The aim of this paper is investigation of GAP. This problem is investigated since the beginning seventh years [1]. At the beginning it was not clear about the method witch gives the best GAP. In [2] is remarked that Lyapunov direct method may gives good results but known difficulties in construction of suitable function prefer other methods.

The firs steps of comparison a some methods are presented in [3]. In [4] it was proved that in the area of the method using the idea of norm of solutions and Lyapunov
function $V(x)$ as generalized Euclidean norm the last one gives the best GAP. The set

$$P(\rho) = \{ x : V(x) \leq \rho^2, \dot{V}(x) < 0 \}$$

in phase space with the biggest $\rho$ represent an ellipsoidal estimation the stability attraction domain. The known in literature examples quality of the proposed method of the GAD are limited to one-degree-of-freedom systems (or two the first order differential equations). In such simple case it is possible to explain the results on phase portrait plain with trajectories. Unfortunately, for more degree-of-freedom systems similar graphic presentation is not clear, because projections of trajectories on the plain may be crossing. In this work the most often applied methods of GAD and the known today results for different equations prepared to the publication in Bulletin of the Technical University of Kielce are presented. For the summary we present at the above picture the known GAD for the one-degree-of-freedom system in the form $\ddot{x} + \dot{x} + x + x^2 = 0$ obtained by different authors.


