The Grad-Shafranov (GS) equation is two dimension nonlinear differential second-order equation. This equation give us the possibility to find axially symmetric equilibrium magnetic configurations of the toroidal plasma column with arbitrary boundary cross section (Tokamak like systems).

Depending on a continuously varying some bifurcation parameter GS equation can have more than one solutions, or may not have a solution at al.

Currently sequential bifurcation theory for the GS equation does not exist.

In this paper the results of numerical analysis of the GS equation is given.

Three type of the static bifurcation equilibrium of plasma column in a tokamak with shaped boundary are examined:

1. Simple bifurcation. In this case there is no macroscopic change in the shape of nested magnetic surfaces [1].

2. Complex bifurcation. In this case there is the macroscopic distortions of the magnetic surfaces take place, but they stay nested (simply connected) [2].

3. Topological bifurcation. In this case in a tokamak additional axes rise, the system of magnetic surfaces becomes multiply connected (non-nested) and currents along the magnetic axes can occur in the same or in opposite directions [3].

The bifurcation diagrams for different current distributions in tokamaks and the results of specific calculations plasma equilibrium bifurcations in the ITER and T-15 devises are presented.