The subject of the project is a mathematical model in the task of a single-epoch, precise, satellite positioning. The main problem in the classic approach to this task is to determine the correct, integer values of the so-called ambiguity, representing the number of full wave cycles included in the phase observation. The number of ambiguities in the processing of double differenced phase observations is equal to the number of satellites minus one. The need of estimating ambiguities, in addition to the position coordinates, means that the classical approach is based on an ill-conditioned mathematical model. The consequence of the weakness of the model is the instability of the solution (slight changes in the set of observations or the model may cause significant changes in the results) which results in low reliability of the solution. Therefore, in the tasks requiring the determination of a precise position with high reliability (geodynamics, measurements of deformation, measurements of the geodetic network), long observation sessions are applied. Thanks to this, the conditioning of the mathematical model is improved. However, in the case of precise positioning based on a single-epoch data, such a solution is not possible for obvious reasons. As a part of the proposed project, it is planned to solve the above problem by replacing the classical mathematical model with another, better conditioned one. The proposed model will not include ambiguities, although the solution will account their integer nature. Decreasing the number of parameters will significantly improve conditioning of the model. The proposed solution is based on the MAFA (Modified Ambiguity Function Approach) method, developed by the author. The author therefore puts forward the hypothesis of the possibility of determining an accurate, stable and reliable solution in the single-epoch, precise positioning by applying the mathematical model underlying the MAFA method. The crucial part of the presenting problem is a proper validation. The various validation techniques will be tested.

Most of the project tasks will be carried out according to the following plan:

- derivation of mathematical formulas concerning a given part of the project (general model, computational techniques, validation procedures)
- development of detailed algorithms that implement the computation process
- implementation of developed algorithms in the Matlab environment
- tests
- analysis of results
- drawing conclusions and recommendations

The reason for undertaking the presented research topic is the wide application of a real time, precise, satellite positioning. This technique is used, among others, in geodynamics, deformation measurements, research related to environmental protection (e.g. when determining some parameters of the atmosphere model, which are part of the phase observation equation). Thus, the nature of the results will be general, not limited only to geodesy. Those results can be interesting as well for researchers working on other problems in the above-mentioned fields.