

Determination of the Relative Position of Objects by the First Phase Measurement Differences of One Epoch

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Abstract. A new method is considered that allows determination of the relative position of objects (the vector of the baseline) within a millimeter error by the the fractional parts of the first differences in the phase measurements of one epoch. It is shown that the unknown coordinates of the end of the baseline vector correspond to the basic minimum of the reduced quadratic function. An algorithm for searching for local minima has been developed, as well as two approaches to selection of the main minimum: decision-making by the threshold and decision-making by the absolute minimum. An algorithm for computing the baseline vector is given and probabilistic and time characteristics are given for its implementation for the case of sharing single-frequency (L_1) range of GLONASS and GPS measurements.

The method is called the "RSS method" by the name of the patent holder (JSC "Russian Space Systems"). A classification of known methods for resolving the ambiguity of phase measurements is presented, which includes the RSS method. The RSS method is a geometric method, in which the search for spatial coordinates of the end of the baseline vector is performed in a geocentric coordinate system with the elimination of the unknown integer number of phase cycles. The method is insensitive to the loss of the count of the phase cycles of the received signals.

Keywords: global navigation satellite systems, relative positioning, phase measurements, elimination of ambiguity