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Precise positioning with multiple GNSS receivers configuration

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The carrier phase ambiguity resolution is the key factor in precise relative positioning. The common approach uses a three step procedure. In the first step a float solution is obtained, then ambiguity search procedure is carried out using the resulting the VCV matrix of the float solution. Finally, the resolved ambiguities are applied to provide a fixed solution. Thus, the accuracy of the VCV matrix of the float solution is an important factor influencing on the ambiguity resolution performance.

The configuration of multiple GNSS antennas and receivers on common moving platform is widely used for attitude determination. This rigid configuration with nearby antennas can form several constraints, which can be used in order to improve the accuracy of the float solution. In specific, known baseline length, relationships between ambiguities on different baselines as well as similar tropospheric and ionospheric delays can be applied in the estimation of the relative positioning model.

The object of the presented research was to develop a method for taking advantage of the abovementioned constraints in order to improve the float solution, and hence, the ambiguity resolution performance. This study is based on processing of medium length baselines in instantaneous, static and kinematic modes. The results show clear improvement in both the float solution and the ambiguity resolution domain.