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Optimum Geoid Fitting Technique for Egypt

Hussein Abd-Elmotaal and Atef Makhloof
Minia university, faculty of Engineering, Civil Engineering Departement, Minia, Egypt (abdelmotaal@lycos.com)

The paper introduces a proposed geoid fitting technique of the physically determined geoid to the GPS/leveling derived geoid in Egypt. First the possible blunders of the available GPS benchmarks are eliminated. The technique works on the basis of the absolute geoid difference (physical geoid minus GPS/leveling derived geoid). The proposed geoid fitting technique selects a number of few best suited GPS benchmarks using an automatic optimization scheme. The influence of each GPS point on the remaining GPS points is computed using the least-squares prediction technique. The GPS point having the minimum influence on the remaining points is added to the subset of the GPS points to be used for the external checking. This step is repeated iteratively, and each time the number of the available GPS is decreased by one, till an acceptable limit of the influence of the GPS points on the remaining ones. This limit has been set for the current investigation to couple of decimeters. The output of this scheme is two subsets. The first subset comprises the points having the minimum influence, which represents the subset used for the external check of the geoid quality. The second subset contains the GPS points used for the geoid fitting process. A practical test of the proposed technique is given and the obtained internal and external geoid accuracies are widely discussed.