The impact of the lateral density variation model in determination of the precise gravimetric geoid in mountainous areas: A case study of Iran

R. Kiamehr

Division of Geodesy, Royal Institute of Technology, Stockholm, Sweden, (ramin@infra.kth.se / Fax: +46 8-7907343)

The existence of topography above the geoid violates the basic assumption of Stokes' formula for the determination of the geoid. Usually a constant density $2.67 g/cm^3$ used in determination of the geoid. However, we know that the density of the topographical masses departs by about 10 to 20 % from the actual mean value of the crustal density. Iran has one of the largest relief and density variations in the world and the geoid computation in this area is affected the most by topographical density effects. The influence on the geoid height coming from the actual and Pratt-Hayford's isostatic models are studied. Numerical results show that the differences in the geoid height due to actual and isostatic density models can reach up to 0.22 and 2.91 m, respectively, which is not negligible in a precise geoid determination with centimetre accuracy. Our results suggest that the effect of topographical density lateral variations is significant enough and ought to be taken into account specially in mountainous regions in the determination of a precise geoid model.