شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قَســـم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

**To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %**

شبكة المعلومات الجامعية

بعض الوثـــائق الأصليـة تـالفـــة

بالرسالة صفحات

لم ترد بالأصـــــل

CIVIL ENGINEERING DEPARTMENT
FACULTY OF ENGINEERING
MINIA UNIVERSITY

COMPARISON OF DIFFERENT GRAVITY REDUCTION TECHNIQUES FOR GEODETIC APPLICATIONS IN EGYPT

A THESIS
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ABSTRACT

It's known that, in principle, all gravity reductions are equivalent and should yield the same geoid if the indirect effect has been taken into account. However, there are some requirements which should be taken into consideration when deciding to use a certain gravity reduction technique to determine the geoid. Mainly, the reduction should yield gravity anomalies that are small and smooth, and it must correspond to a geophysical meaningful model. Also, the indirect effect should be as small as possible.

The main aim of this study is the comparison among all gravity reduction methods that are used to reduce the gravity from the earth's surface to the geoid, and using the reduced gravity for determining the geoid in Egypt, which is considered the most important geodetic application. These methods are: free-air reduction, Bouguer reduction, isostatic reduction (Pratt-Hayford, Airy-Heiskanen), the Rudzki reduction and Helmert reduction. For doing this study, a computer programs were used for calculating the gravity anomalies for all gravity reduction techniques, and also for calculating the geoid for Egypt. Data used are gravity observations, digital terrain model for Egypt and constant density of 2.67 g/cm^3.

The results show that, isostatic gravity reduction (Pratt-Hayford, Airy-Heiskanen) is the best method for reduction where it gives gravity anomalies that are small, smooth and slightly osculating around zero, but the indirect effect in Pratt-Hayford isostatic reduction on gravimetric quantities is slightly large. Bouguer reduction gives systematically negative gravity anomalies increased under mountains, but they are smooth. Also, gravity anomalies calculated from free-air gravity reduction are approximately equal to the same values from Helmert method, but the latter are smoother. Moreover, the gravity anomalies calculated from Rudzki reduction are big and do not have a geophysical meaning. In addition, the geoid calculated from isostatic gravity anomalies is not completely equivalent to the geoid calculated from free-air gravity anomalies. Finally, it has been demonstrated that, refining the digital terrain model for Egypt and determining the density field from geological observations are expected to increase the accuracy of isostatic gravity reduction, and hence, the reliability of produced gravimetric geoid for Egypt.

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