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OPTIMUM COMBINATION OF GLOBAL GEOPOTENTIAL MODEL (GGM) AND GLOBAL DIGITAL ELEVATION MODEL (GDEM) IN GEOID MODELLING OVER PENINSULAR MALAYSIA

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Under - Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Geoid modelling plays a vital role in the field of geomatics, and its accuracy is influenced by factors, including the input data of Global Geopotential Models (GGM) and Global Digital Elevation Models (GDEM). Nowadays, numerous GGM and GDEM models exists and made freely accessible, each models represent different accuracy. Selecting the optimal combination is vital for accurate geoid modelling. Therefore, this study aimed to identify the optimal combination of GGM and GDEM in geoid modelling over Peninsular Malaysia. Three different GGMs which is Tongji-GMMG2021S, XGM2019, and GO CONS GCF 2 DIR R6 and three different GDEM which is Shuttle Radar Topography Mission (SRTM), Advanced Land Observation Satellite (ALOS), and Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) were employed in order to compute geoid height. The geoid computation utilized the Royal Institute of Technology (KTH) method, specifically the Least Square Modification of Stokes' formula with additive corrections (LSMSA). Prior to geoid computation, terrestrial, marine, and airborne gravity data were combined and gridded using 3D Least Square Collocation (LSC). Furthermore, all the GGM and GDEM were evaluated using 45 GNSS Levelling Points. Subsequently, the gravimetric geoid model was resulted in nine different models. To identify the best combination of GGM and GDEM, all models from different combinations were evaluated using the same GNSS-levelling data. GGM and GDEM of XGM2019 and ALOS demonstrated the highest accuracy, with Root Mean Square Error (RMSE) of 0.065m and 3.426m, respectively. Meanwhile, the RMSE from the nine models ranging from 0.03m to 0.04m. and the best combination of GO CONS GCF 2 DIR R6 and SRTM yielded a RMSE of 0.0376m. However, the effects of GGM gives the most significant impacts towards geoid modelling compared to the GDEM.

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