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OPTIMUM APPROACH TO DETERMINE ORTHOMETRIC HEIGHT AT MYRTKNET STATION

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BACHELORS IN SURVEYING SCIENCE AND GEOMATICS (HONOURS) - AP220

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Thesis submitted in fulfilment
of the requirements for the degree of
Bachelors in Surveying Science and Geomatics (Honours)

College of Built Environment, CBE.

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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

MyRTKnet serves as an infrastructure system comprising a network of reference stations for the Global Navigation Satellite System (GNSS). This system is overseen by the Department of Survey and Mapping Malaysia (DSMM). As part of its future objectives, DSMM seeks to enhance MyRTKnet's capabilities by incorporating the computation of orthometric height information through the GNSS leveling method. Presently, orthometric height data is lacking at MyRTKnet stations. Consequently, this study aims to investigate the most effective approach for determining orthometric height at these stations, employing two distinct approach. In the first approach, the mean sea level (MSL) height from two nearby standard benchmarks is initially transferred to the Arau and UUM stations. Subsequently, this process is systematically extended to other stations using the relative GNSS leveling method. This computation involves the utilization of three gravimetric geoid models: PMGG2020, Wgrav, and PMSGM2014. For the second approach, orthometric height at each station is determined using a hybrid geoid model, namely WMGEOID04, PMHGM2020, and PMSGM2014, tailored for absolute GNSS leveling. To evaluate the accuracy of the derived orthometric heights at each MyRTKnet station, these heights are transferred back to the nearest benchmark and compared against the established values at the respective Bench Mark (BM) or Static Bench Mark (SBM). Upon analysis, the first approach reveals that orthometric heights derived using the Wgrav model exhibit superior accuracy compared to other models, demonstrating a root mean square error (RMSE) of 0.0799m. In contrast, the second approach indicates that the WMGEOID04 hybrid geoid model surpasses other hybrid geoid models in accuracy, presenting an RMSE of 0.0632m. In essence, this study seeks to enhance MyRTKnet's functionality by ascertaining the optimal method for determining orthometric height at its stations. Through comprehensive evaluation, the research underscores the superior accuracy achieved using specific models, thereby contributing to the advancement of accurate geodetic computations and applications within the GNSS framework.

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