TIDAL CURRENTS IN THE COASTAL WATERS OFF TERENGGANU

FATHY KAMEEL MOHD FADZIL

Thesis Submitted in Fulfillment of the Requiment for the Degree of Master of Science in the Institute of Oceanography

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DEDICATION

To My Father, Mohd. Fadzil Hussin

To My Mother, Khabsah Jafri

To My Wife, Fatimah Noor Harun

To My Son, Firas Kameel Fathy Kameel

And To All My Family members

Thank You for All The Support

ABSTRACT

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of requirements for the degree of Master of Science

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Chairperson : Mohd. Fadzil Mohd. Akhir, PhD.

Member : Professor Mohd. Lokman Husain, PhD.

Faculty : Institute of Oceanography and Environment

In this research, the ocean current data measured in Merang water, Terengganu was studied. Acoustic Wave and Current Profiler also known as AWAC was deployed in the research area from August 2008 to August 2009 to collect the ocean current data. Accordingly, the data were measured in 1 hour time interval during 7 months of data collection. With respect to the measured data, the focus of this research are to investigate the tidal variations and tidal current in Merang water and to determine the dynamics of tidal current circulation and the influence of seasonal changes in Merang water.

The results found that the area has a tidal response; mixed type dominated by diurnal and semidiurnal. Moreover, the ellipse analysis is conducted to determine the highest current velocity in the constituents, and the results found that K_1 has a velocity faster than M_2 according to the ellipse diagram. Furthermore, the result from semi-major and semi-minor axis K_1 also showed that it was higher than M_2 in the study area.

In addition, the result from the progressive vector diagram has presented the water circulation system in this area and showed the current was travelling towards southwest during northeast monsoon and towards the northeast during southwest monsoon. Besides, the statistical analysis was also applied to determine the net drift for the area. The mean velocity component ranges from 0.01 to 0.05 (m/s) for *u*-component and 0.001 to 0.03 (m/s) for *v*-component, showing the net drift to certain directions during each period. In the meantime, the standard deviation values range from 0.11 to 0.14 (m/s) for *u*-component and 0.07 to 0.10 (m/s) for *v*-component. Finally, the observation period revealed that the current's direction was dominated by south-easterly.

ABSTRAK

Abstrak tesis yang dikemukan kepada senat Universiti Malaysia Terengganu (UMT) sebagai memenuhi keperluan untuk Ijazah Sarjana Sains

ARUS PASANG SURUT DI KAWASAN PERAIRAN TERENGGANU

FATHY KAMEEL MOHD FADZIL

Disember 2014

Pengerusi : Mohd. Fadzil Mohd. Akhir, PhD.

Ahli : Profesor Mohd Lokman Husain, PhD.

Institut : Institut Oseanografi dan Sekitaran.

Kajian ini dijalankan terhadap data arus laut yang dicerap di kawasan perairan Merang, Terengganu. Cerapan ini dilakukan dengan menggunakan alat gelombang akustik dan profil arus (AWAC) dari bulan Ogos 2008 sehigga Ogos 2009. Data dicerap dengan selang masa satu jam dan cerapan dapat dilakukan bagi tempoh tujuh bulan. Melalui data yang diperolehi, fokus kajian ini ialah untuk menentukan variasi pasang surut dan arus pasang surut di perairan Merang dan menentukan keadaan dinamik corak peredaran arus pasang surut serta pengaruh perubahan musim terhadapnya.

Hasil analisis mendapati, bahawa pasang surut didominasi oleh percampuran antara diurnal dan semidiurnal. Seterusnya analisis elips dalam menentukan juzuk paling laju dalam kelajuan arus menunjukkan K_1 lebih laju berbanding M_2. Ini juga disokong oleh keputusan dari paksi separa utama dan paksi separa kecil menunjukkan K_1 juga mempunyai nilai yang lebih besar berbanding M_2.

Sistem peredaran arus laut di kawasan kajian juga menunjukkan arus bergerak arah barat daya semasa monsun timur laut dan arah timur semasa monsun barat daya. Selain itu, analisis statistik turut digunakan untuk menentukan hanyutan bersih bagi kawasan ini. Purata nilai hayutan bersih pada komponen-komponen halaju ialah 0.01-0.05 (m/s) untuk komponen *u* dan 0.001-0.03 (m/s) untuk komponen *v*. Dalam pada itu, nilai sisihan piawai yang diperolehi adalah di antara 0.11-0.14 (m/s) untuk komponen *u* dan 0.07 hingga 0.10 (m/s) untuk komponen. Akhirnya, didapati peredaran arah arus didominasi ke arah tenggara.