BAGAIMANA MEREVIEW JURNAL?

UPAYA DALAM MENCARI KEBENARAN ILMU PENGETAHUAN

Oleh:
Aulia Siti Aisjah -TEKNI FISIKA - ITS

Langkah Penting dalam Meriveuw Jurnal (1)

Bacalah bagian pendahuluan,

kemukakan – 1. **Tujuan dari riset**/penulisan artikel –

2. **Alasan penulis memilih problem**,

3. sisi mana yang menarik dan **layak diangkat**

Evaluation of Neuro Fuzzy and Numerical Wave Prediction Models in Lake Ontario

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INTRODUCTION

Wind waves play a significant role in all ocean related activities. They damage shore protection structures, reshape beaches and affect marine structures and are hence important for commercial, military and recreational activities. Therefore, it becomes necessary to understand the characteristics of waves that impact various operations in offshore and coastal regions. However, in most cases little wave data is available for engineering construction and planning. Field observation and physical modelling of waves are extremely difficult, costly and time-consuming. Remote-sensing instruments, used in recent years, do not systematically provide the desired resolution in some cases and no instrument can in any case anticipate future sea states. The desired sea-state information may thus be obtained using reliable wave models. In the literature, several approaches have been proposed to wave predictions which are empirical based, soft-computing based and numerical based approaches. During the past decades several numerical models such as WAM (WAMDI GROUP, 1988), SWAN (BOOIJ et al., 1999) and MIKE 21 (DHI, 2004) were developed and employed to predict wave characteristics in different cases. Numerical models are generally based on a form of the spectral energy or action balance equation. Recently, a new generation spectral wind-wave model called SW model has been presented in MIKE 21 software. SW model is based on unstructured meshes and simulates the growth, decay and transformation of wind generated waves and swell in offshore and coastal areas.

Recently, Fuzzy Inference Systems (FISs) and Artificial Neural Networks (ANNs) have been used to develop wave prediction models. FISs are based on expertise expressed in term of 'IF-THEN' rules which can be used to predict uncertain systems. ANNs may essentially be used as semi-parametric regression estimators which can approximate virtually any function up to an arbitrary degree of accuracy. AGRAWAL and DEO (2002) and TSAI et al. (2002) have used ANNs for forecasting wave parameters. KAZEMINEZHAD et al. (2005, 2006) have also used fuzzy inference systems and neuro-fuzzy computing techniques in the prediction of wave parameters in fetch limited conditions. In this study, the performance of the MIKE 21 SW model and a neuro-fuzzy model for predicting wave parameters were investigated.

THE SPECTRAL WAVE MODEL

Spectral Wave (SW) model is a new generation wind-wave model. The model includes two different formulations which are the fully spectral formulation (FS) and the directional decoupled parametric formulation (DDP). The FS formulation is based on wave action conservation equation (KOMEN et al., 1994) where the directional frequency wave action spectrum is a dependent variable. The DDP formulation is based on a parameterisation of the wave action conservation equation. The parameterisation is made in the frequency domain and the zeroth and first moments of the wave action conservation are considered as dependent variables (HOLTHUIJSEN, 1989). In the SW model the basic conservation equations can be formulated in Cartesian (small scale

Jurnal ke 1:

Judul	
Author	
Tahun	
Tujuan	
Masalah yang diangkat	
Solusi	
Desain (ekseperimen) yang ditawarkan	
Apakah eksperimen berhasil	
Bila eksperimen tidak berhasil, apakah penyebabnya	
Apakah kesimpulan menjawab permasalahan	
Letak kontribusi terbesar dari penelitian	

Baca di Pendahuluan:

- **Letak originalitas penelitian**. Apakah penelitian itu mengemukakan satu pendekatan baru terhadap masalah yang sudah ada, ataukah memakai metode yang sudah ada untuk memecahkan satu aplikasi baru yang menarik, ataukah baik pendekatan maupun aplikasinya semua baru
- **Masalah apakah yang ingin dijawab oleh author** ? (problem formulation)

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Bacalah bagian diskusi,

kemukakan :

- Solusi apakah yang dipakai oleh author untuk menjawab pertanyaan riset di atas ?
- Bagaimana author mendesain eksperimen untuk menguji sistem yang dibuat ?
- Apakah eksperimen itu berhasil ?
- Apakah ada contoh eksperimen yang tidak berhasil ? (mestinya selalu ada, karena tidak ada penelitian yang sempurna). Bagaimana author membahas penyebabnya ? Ataukah penyebab itu tidak dibahas sama sekali ?

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interaction was used in the simulations. Since the wind speed used in SW model should be measured at height of 10 metres above the sea level the equation (9) was used to convert the measured wind speed to the 10 metre height's one.

Geographical domain (Lake Ontario) was discretised using 1322 unstructured triangle elements. The frequency domain was discretised using logarithmic type discretisation. The minimum frequency, the frequency ratio and the number of discrete frequencies were selected 0.055 Hz, 1.1 and 25, respectively. Hence the frequency spectrum was resolved within the frequency range [0.055; 0.6] Hz. In this study time step was 300 seconds in all simulations.

The Model was calibrated using data set of year 2005 consisting of 611 hourly wind and wave measurements. As mentioned before, SW model has several calibration factors. Since the model was calibrated in deep water, the most important calibration factor is the whitecapping factor (c_{ds}^*).

The scatter index (SI) and bias are used to evaluate the degree of accuracy of the results. These parameters were calculated as

$$SI = \left(\sqrt{\frac{1}{N}\sum_{i=1}^{N}(P_i - O_i)^2} \right) \left(\sum_{i=1}^{N} O_i \right)^{-1}$$

$$bias = \frac{1}{N}\sum_{i=1}^{N}(P_i - O_i) \tag{11}$$

Table 1: Error statistics calculated in calibration stages

c_{ds}^*	wave height (H_S)		wave period (T_P)	
	SI (%)	Bias (m)	SI (%)	Bias (s)
4.5	23.6	-0.19	15.5	-0.35
4	20.5	-0.14	14.9	-0.29
3.5	17.7	-0.09	14.5	-0.23
3	15.6	-0.03	13.9	-0.16
2.6	14.7	0.02	13.8	0.12

Neuro Fuzzy Model Development

The neuro fuzzy (ANFIS) model was developed and trained using data set of year 2005. The data set of year 2005 was divided in 2 parts. The first one was used in FIS development and also as training data in ANFIS modelling (430 data point) and the second one as checking data in ANFIS modelling (181 data point) to ensure over-training is not occurred.

Using the subtractive clustering method and training data including wind speed, fetch length and wind duration as input variables and wave heights as the output variable, an FIS was developed for wave height prediction. The developed FIS was then used as an initial FIS for ANFIS modelling. ANFIS optimises

Similarly, another FIS and ANFIS models were developed for prediction of wave period. The developed model was then used to predict the wave period using testing data. Figure 3 shows the comparison between observed and predicted wave periods.

Table 2: Error statistics of predicted wave parameters by the SW and ANFIS models

Model	wave height (H_S)		wave period (T_P)	
	SI (%)	Bias (m)	SI (%)	Bias (s)
SW	22.1	0.00	12.9	–0.06
ANFIS	31.3	0.01	13.8	0.10

- Bacalah bagian conclusion dan coba cari
informasi berikut Apakah kesimpulan itu
menjawab semua pertanyaan yang diajukan
pada bagian introduction ?

SUMMARY AND CONCLUSIONS

In this study the performance of SW and ANFIS models for the prediction of wind wave characteristics were investigated. To calibrate the models, the data set of Lake Ontario in year 2005 was used. Calibration of SW model showed that the most important calibration parameter in deep water is the whitecapping parameter. KOMEN $et\ al.$ (1994) proposed $c_{ds}^{*}=4.5$ while in the studied case the best results obtained by using $c_{ds}^{*}=2.6$. Results indicate that the errors of SW model in predicting wave parameters are less than the ANFIS model's ones. The scatter index of SW model in predicting significant wave height is 22.1 % while the ANFIS model's one is 31.3 %. The observed errors in the results of SW model may be due to the usage of constant wind in domain. It was seen that the scatter indices for predicted H_s by both SW and ANFIS models are larger than the ones for predicted T_p .

Dimanakah letak kontribusi terbesar dari penelitian itu ?

❑ Apakah ada masalah penelitian yang masih belum diselesaikan ?

❑ Apakah anda memiliki ide lain untuk memecahkan masalah yang sama ? Dimanakah kelemahan dari paper yang anda baca ? (isi, penyajian, dsb) Bacalah bagian referensi dan coba cari informasi berikut apakah referensi yang dipakai uptodate (tahun-tahun terakhir) ? Ataukah paper yang dijadikan referensi sudah terlalu lama ?

❑ Sekiranya anda tertarik untuk mengerjakan riset pada tema yang berdekatan, catatlah paper atau buku penting yang tercantum pada bagian referensi paper tsb.

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ACKNOWLEDGEMENTS

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Bacalah bagian kesimpulan.

Kemukakan :
- ❑ Apakah kesimpulan itu menjawab semua pertanyaan yang diajukan pada bagian introduction ?
- ❑ Dimanakah letak kontribusi terbesar dari penelitian itu ?
- ❑ Apakah ada masalah penelitian yang masih belum diselesaikan
- ❑ Apakah anda memiliki ide lain untuk memecahkan masalah yang sama

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(isi, penyajian, dsb)

❑ Bacalah bagian referensi dan coba cari informasi berikut apakah referensi yang dipakai uptodate (tahun-tahun terakhir) ? Ataukah paper yang dijadikan referensi sudah terlalu lama ?

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Apa yang Perlu Ditampilkan dalam Review ?

❏ Latar Belakang Teori dan Tujuan Penelitian

Mengungkapkan beberapa landasan teori yang digunakan oleh peneliti sebagai acuan dalam penelitiannya dan tujuan apa yang ingin dicapai.

❏ Metode

Mengungkapkan metode yang digunakan, subjek penelitian, teknik pengumpulan data, alat pengumpul data, dan analisis data yang digunakan.

❏ Hasil dan Pembahasan

Dalampokok bahasan ini mengambil hasil dari penelitian yang telah dilakukan dengan memberikan deskripsi secara singkat, jelas, dan padat.

Contoh – dalam mereview jurnal – dapat dituliskan secara singkat spt tabel di bawah

No	Tahun	Nama Penulis	Latar belakang	Tujuan	Metode	Hasil dan Pembahasan	Referensi
1	2012						
2	2014						

Silahkan mereview Jurnal