Ocean Science

Discussions

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Interactive comment on "An analytical study on M$_2$ tidal wave in the Taiwan Strait with the extended Taylor's method" *by* Di Wu et al.

Anonymous Referee #2

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General comments

This paper contains original contribution to analytical tide modeling using an Taylor' method. Although there are quite many thing to be clarified and improved, it is believed that authors can revise the manuscript without much difficulties. This paper is therefore recommended for the publication in OS with minor corrections.

Specific comments

Title

Pg.1, lines 1-2 Better to replace "the extended Taylor's method" to "an extended Taylor's method".

Abstract

Pg. 1, line 8: Again use "an extended Taylor's method Pg. 1, lines 21-22: The sentences are a little bit unnatural. Include how much the northward KW is strengthened, that is, quantitatively, saying it is of secondary importance.

1 Introduction

Pg. 2, line 4: The expression "anti-nodal band" is not familiar. Is there anybody to use the expression? Pg. 2, line 18: Again use "an extended Taylor's method Pg. 2, lines 27-28: What is the basis of "The statement "the topographic step south of the TS acts as a permeable interface which can only partially reflect the incident wave and .... by nearly 180 degree at the step". Previous studies? If not, authors already assume partial reflection of northward and southward waves at the step. More careful writing is needed. Pg. 4, line 9: Again use "an extended Taylor's method.

3. An analytical model for the Taiwan Strait

3.1 Model configuration and solution Pg. 7, lines 1-2: Reference for the friction coefficient formula is required. Pg. 7, line 5: The expression "observed harmonic constants from the global tide model" is a little bit strange. It is computed results not observed values. Recommend to change the expression. Pg. 7, line 6: In Figure 3(a) open boundary values appear to be somewhat different with Figure 2. Describe how the global model results were adopted to the analytical model. Pg. 7, lines 15-16: The statement "that is, the wave propagates southward in the northeast area and propagate northward in the southeast area" may be incorrect in strict sense. Figure 4 shows in whole area there are southward and northward Kelvin waves. ,Rewriting is needed. 3.2 Kelvin waves and Poincare modes Pg. 8, line 6: In Figure 3(a) open boundary values appear to be somewhat different with Figure 2. Describe how the global model results were adopted to the analytical model. Pg. 8, lines 9-10: The statement "the amplitude variation along the northern boundary ......owing to the fact that the M2 tide is from the Pacific Ocean" is obscure. The northern boundary values of Fig. 3c and

Fig.3a can be different from each other even though the M2 tide did not come from pacific Ocean. More careful discussions are required. Pg.8, lines 17-18: The statement "it is not a controlling factor" is too much definite. Obliqeness might be partly effective. Improve the statement.

4 Formation mechanism of the northward Kelvin wave in the Taiwan Strait

4.1 Reflection of the incident wave from the East China Sea at the topographic step Pg. 9, line 17: "observation taken from the global tide model" needs to be changed as mentioned earlier. Pg. 10. 4: Include reference for "the resonant period of the ECS (13.7h)".

5. Summary and discussion

Pg. 14, lines 1-2: Regarding the statement " the reflected wave is slightly weaker", authors implied that there is a partial reflection of southward KW at the step. It is noted that at the northern open boundary southward KW, northward KW and Poincare waves are all specified in Ex.1. If there is northward KW at the northern open boundary, there should be northward KW at the southern open boundary, regardless of topography. It is curious to know what will happen if only southward KW is imposed at the northern boundary in Ex.1. Additional experiment is recommended to clarify the partial reflection at the step. You may include results in appropriate place.

Technical corrections

Pg. 1, line 29: Better to replace "M2 amplitudes" to "M2 tide". Pg. 3, lines 5-6: Definition of phase lag needs to be added. Pg. 11, line 2: In Figure caption, there is no (d).