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Ocean Science Discussions

Interactive comment on "Study on the Tidal Dynamics of the Korea Strait Using the Extended Taylor Method" *by* Di Wu et al.

Anonymous Referee #2

Received and published: 21 October 2020

General comments:

This paper contains an original contribution to the co-oscillating tide in Sea of Japan (East Sea) using an extended Taylor method. Writing is considered to be reasonably good with fine piece of references. However, there is an important point authors need to make correction to enhance the quality of the paper. Specifically, extension of the three sub-region model to four sub-region model is requested. Reviewer think the extension work is not difficult but considerable time around two months might be required to make correction of the content of manuscript. For that, a major revision is recommended.

Detailed comments:

Pg.4, Lines 14-20: Authors constructed a model with three sub-regions as seen in

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Fig. 3. However, water depth of Fig.1 and tidal chart of Fig.2 indicate the necessity of including Tartar Strait region in the analytical model. Extension of the three sub-region model to the four sub-region model is requested. On the while, review think, though not much important, representing the Japan Sea (East Sea) as the Area 2 with width W1+W3 might be sufficient rather than width W2 unless the shallow water depth along the northern coastline of Japan is considered.

Pg.7, Line 16: Authors used the Collocation approach. In fact there is another approach called Galerkin approach. Briefly comment why authors used Collocation approach. Is it mainly due to its simplicity?

Pg.8, Lines 11-12: Authors state that the influence of tide-generating force on the KS is negligible. Reviewer does not agree on this statement because the influence of direct tide generating force (DTGF) on the tide in JS can be significantly large, indirectly affecting on the tide in KS even though its direct influence on the KS is small. Reviewer think co-oscillating tide may be dominant in Japan Sea (East Sea) but DTGF has some non-negligible effects.

Pg.9, Lines 10-12: In Table 1, it is noted that water depth of area 3 is 1783m, which is comparable with that of Area 2. With the model reproduction of tide in Tartar Strait shown in Fig.2 is hardly expected.

Pg.11, Lines 11-12: Authors' statement such that the model-produced tidal systems agree fairly well with the DTU10 result is reasonably acceptable. Reviewer however notices that there are some important points authors did not comment. Close examination of Fig.5 reveals that DTU10 produces amphidromic point further north than that calculated by the analytic model and that DTU10 and analytic model produces different contour patterns in Area 2 and Area 3. Reviewer thinks that these are due to neglecting the shallow Tartar Strait region in the analytic model. Again it is addressed that Area 3 is too deep and short to include the effects of presence of the Tartar Strait. According to reviewer's modeling experience, the tides in JS (East Sea) and KS vary sensitively

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with change of bottom frictional coefficient in the Tartar Strait.

Pg.12, Lines 3-5: Authors state with regard to Fig. 6 that the greatest phase lag error occurred at the northernmost corner of JS due to the existence of degenerated amphidromic point near the area. This supports the necessity of developing an extended model which takes into account the shallow Tartar Strait region.

Pg.16, Line 1: Authors discussed tidal dynamics in KS-JS basin with emphasis on the amphidromic point. However, it is hard to find any discussions related to the influence of Area 2. Reviewer think this is because no meaningful contribution by Area 2. Again, it is strongly addressed that extension of the three sub-region model to the four sub-region model is required.

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