We would like to thank referee #1 for the discussion.

The study of Zhang et al. focuses on wave attenuation by vegetation. Specifically, the authors look at an exponential and reciprocal function that describes wave height, and the accompanying damping factors. These damping factors both use the drag coefficient Cd, and the authors derive a new function that connects the two damping factors. Eventually, the authors predict Cd based on the different methods and damping factors. They conclude that the two damping factors are almost equal for submerged vegetation, but the new equation can be used for both submerged and emerged vegetation.
Generally, I like how the authors present their data, and find their conclusions well-supported with what they show. However, I still have several issues that the authors may want to improve on.

#1 Something that confuses me throughout the whole manuscript, is that several steps to get to the drag coefficient are not clearly described. For example, in the results section (sect. 5.1 and 5.3.3) the authors say they calculated alpha, but then the value of k should be known. So how was this done exactly? See also my minor comments for more examples. Generally, I think it would be good if the authors add one extra section in the methodology, where the method related to each section in the results is explained in more detail. There, the authors could state specifically, and maybe even step-wise, which equation was used in which way.

- Sentences (red marked) has been added or modified in the manuscript to show this methodology:

(1)P2,L41. Section 1. "These two calibration functions describe local wave height with a distance from the beginning of vegetation and a factor reflecting the damping, so the corresponding factor can be calibrated based on measured wave height through the vegetated area."

(2)P2,L45. Section 1. "Overall, the drag coefficient can be calculated by calibrating α' or k' using measured data, then the researchers build non-linear relations between C_D and hydraulic parameters such as the Reynolds number (e.g., Hu et al., 2014; He et al., 2019). In this way, the drag of vegetation in water becomes predictable based on the values of these hydraulic parameters under different operating conditions."

(3)P7,L173. Section 5.1. "Additionally, with the calibrated k value from Eq. (8), we can calculate the value of α according to Eq. (11). Applying the calculated α in Eq. (7), the calculated relative wave height, which is named by Eq. (11) in Fig. 2, is appliable to fit the measurement as the figure shown."

(4)P9,L199. Section 5.3.1. "Both methods by Dean (1979) and Dalrymple et al. (1984) consider wave height decaying by the reciprocal function, in which the damping factor can be calibrated by local wave height. In this case, the value of the drag coefficient can be calculated using Eq. (2) or Eq. (3), and the comparison of results by these two equations is shown in Fig. 4."

(5)P10,L213. Section 5.3.2. "The calibrated value of C_D by Kobayashi et al. (1993) was obtained by calculating C_D using Eq. (5) on the base of the calibrated exponential damping factor. Figure 5 revealed that C_D by Eq. (5) is always smaller than C_D by Eq. (3)."

(6)P11,L223. Section 5.3.3. "The new method obtains the damping factor α' by using the calibrated k' based on measured wave height and Eq. (12), so the drag coefficient C_D can be calculated by Eq. (3)."

#2 I am also a bit confused about the Taylor expansions and how the authors arrive exactly at equations 11 and 12. This may be the lack of knowledge about this topic on my side, but I believe it is important to elaborate here and make it really clear to the reader what has been done and why.

- According the literature: the Taylor expansion is the standard technique used to obtain a linear or a quadratic approximation of a function of one variable. Recall that the Taylor expansion of a continuous function $f(x)$ is:

$$f(x) = f(a) + (x-a)f'(a) + (x-a)^2\frac{f''(a)}{2!} + \cdots (x-a)^n\frac{f^{|n|}(a)}{n!} + \cdots R(x)$$

where $R(x)$ represents all the terms of higher order than a level, and a is a 'convenient' value at which to evaluate $f(x)$.

- We scaled the reduction functions:

$H/H_0 = 1/(1+\alpha'X) = 1/(1+\alpha x) = F(x),$ (7)

$H/H_0 = \exp(-k'X) = \exp(-kx) = G(x),$ (8)

- So by using Taylor expansion, Eqs. (7) and (8) can be derived as following when x equals half:

$$F(x) = \frac{2}{\alpha+2} - \frac{4\alpha}{(\alpha+2)^2}(x-1/2) + \frac{8\alpha^2}{(\alpha+2)^3}(x-1/2)^2 - \frac{16\alpha^3}{(\alpha+2)^4}(x-1/2)^3 + R_1(x) \quad (9)$$

$$G(x) = \frac{1}{e^{k/2}} - \frac{k}{e^{k/2}}(x-1/2) + \frac{k^2}{2e^{k/2}}(x-1/2)^2 - \frac{k^3}{6e^{k/2}}(x-1/2)^3 + R_2(x), \quad (10)$$

- Zhang et al. (2021) found that the first two terms of Eqs. (9) and (10) played the most significant role. Hence, considering only these two terms in Eqs. (9) and (10), the proportionality between the two first terms:

$$\frac{2}{\alpha+2}\Big/\frac{1}{e^{k/2}} = \frac{4\alpha}{(\alpha+2)^2}(x-1/2)\Big/\frac{k}{e^{k/2}}(x-1/2)$$

- Formula simplification results in:

$\alpha/k = 2/(2-k)$, (11)

which equals:

$\alpha'/k' = 2/(2-k'L)$, (12)

Because α $(= \alpha'L)$ (-) is the scaled damping factor α', k $(= k'L)$ (-) is the scaled exponential damping factor k'.

#3 I think the authors also need to elaborate the discussion. Especially the analyses to relate Cd to Re, KC and Ur are hardly discussed, and I think the authors should reflect here on the implications of their findings. Why is it important to link Cd to the parameters and what can we do with these findings? This is probably obvious for the authors, but it is good to also stress this for the reader.

- Sentences has been added or modified in the manuscript to show this answer this question:

- (1)P2,L45. Section 1. "Overall, the drag coefficient can be calculated by calibrating α' or k' using measured data, then the researchers build non-liner relations between C_D and hydraulic parameters such as the Reynolds number (e.g., Hu et al., 2014; He et al., 2019). In this way, the drag of vegetation in water becomes predictable based on the values of these hydraulic parameters under different operating conditions."

- (2)The beginning of Section 5.4.1 in Page 12: "Relating calibrated C_D to R_e, KC, or Ur is a common method to predict C_D without measured wave height."

#4 In addition, the authors should also make clear to the reader why the new equation is helpful and why the methods need to be linked. This is briefly done on page 16, but the main point seems here that you can use MS Excel, which is not a good argument in my view (there are so many free tools available, Python, R etc.). So please state clearly what new insights we gain from this and how it is helpful.

- The result based on Eq. (12) is comparable to the classic Eq. (3), this is because the effectiveness of Eq. (12) which we want to study further in this manuscript. Previously, Cd can be calibrated by Eq. (3) based on the reciprocal function, and by Eq. (5) and the exponential function. Now we found the latter method is only applicable in submerged cases. But we can also use the exponential function to describe the decay of the wave height for emerged cases and calculate the drag coefficient by transforming k to alpha by Eq. (12).

- The following paragraph has been added in Section 5.3.2, Page 10:

"For submerged cases, the drag coefficient by Eq. (5) is close to but smaller than that by Eq. (3), with a slope of 0.96 in Fig. 5; for emerged cased, the former is more smaller than the latter when the drag coefficient is larger. This is consistent to the conclusion in Section 5.2 since C_D has positive correlation with α and k."

■ The following paragraph has been added at the end of Section 5.3.3, Page 11:

"Based on the results in Figs. 5 and 6, the exponential damping factor k' can be used to calculate C_D while it needs to be converted to α' based on Eq. (12) instead of to use k' directly."

■ Please see the reply to Reviewer#2 for more detail.

#5 Lastly, my list of minor issues is still rather long and probably not even complete. Therefore, I would suggest that the authors go over the article again in full detail and try to improve their text.

■ Thanks for the correction of language. The language has been checked and will be checked further.

To conclude, I like the study and believe the results are clear. Most of my comments are merely textual, so I believe the authors could easily improve the manuscript. I hope the authors find my comments useful, and I am looking forward to a revised version of the manuscript.

Minor comments

Abstract → The abstract should not refer to the main text, so it is better to remove the equation
numbers.

#1 P1.L16. Predicting → predict

■ It has been edited.

#2 P1.L24 of practical → of practical use?

■ It has been modified to "it is practical to …".

#3 P1.L24 barrier→ barriers

■ It has been edited.

#4 P1.L29. What do you mean with floodplain resources?

■ It has been modified to "land resources in floodplain".

#5 P2.L32. Water motion in researches → water motion, as investigated in different researches

■ It has been edited.

#6 P2.L36. Complicate → complicated P2.L39. Following → follow a

■ It has been edited.

#7 P2.L44. Later → that?

- It has been deleted.

#8 P2.L47. then→ that?

- No modification required.

#9 P3.L64. Vertical, rigid cylinder → a vertical, rigid cylinder / vertical, rigid cylinders ?

- It has been modified to "vertical, rigid cylinders".

#10 P3.L66. Of circular → of the circular

- It has been edited.

#11 P4.L100. What do you mean with the proportionality? I am not sure if I follow how you get to Eq. 11.

- This sentence has been edited:

"the proportionality between the two first terms $\frac{2}{\alpha+2}/\frac{1}{e^{k/2}} =$

$\frac{4\alpha}{(\alpha+2)^2}(x-1/2)/\frac{k}{e^{k/2}}(x-1/2)$ results in:"

#12 P4.L112. Understanding → understand

- It has been edited.

#13 P4.L120. Why do you use that specific formula?

- The last part of Section 2 has been edited:

"The following two formulas are most possible solutions to study the relation between C_D and these parameters (He et al., 2019; Hu et al., 2014):

$$C_d = a\exp(-b\bar{X}) \tag{13}$$

$$C_d = a + (b/\bar{X})^c \tag{14}$$

where $\bar{X}$ could be R_e, KC or Ur; a, b, c are factors. Suitable values of these factors can be obtained by calibrated values of C_d, and in this way, C_d becomes predictable by these parameters. We obtained the values of the factors and the corresponding adjusted R-square, and it is hard to tell the difference between the results from Eqs. (13) and (14) so the former is used because it is exponential and it has only two variable factors.

#14 P4.L131. The three lengths of the canopies → here you mean the horizontal length, correct? So, x in Figure 1?

- Yes. "The three lengths of the canopies" has been modified to "The three horizontal lengths of the canopies".

#15 P4.L132. these → the

- It has been edited.

#16 P4.L132. Depth → depths

- It has been edited.

#17 P4.L140. List → listed

- It has been edited.

#18 P5.L141. Collected more → collected during more?

- Yes. It has been edited.

#19 P7.L151. Had shown → determined?

- It has been edited.

"Besides experiments in this study, observations in published literatures have been collected from Hu et al. (2014), Wu et al. (2011), and Wu and Cox (2015, 2016) as Zhang et al. (2021) presented."

#20 P7.L158. In laboratory → in a laboratory

- It has been edited.

#21 P7.L173-174. Also...useful.→ How did you use Equation 11 here? How did you determine the k-value?

- It has been edited.

#22 P8.L180. Was shown → is shown

- It has been edited.

#23 P8.L187. did not strongly affect → was not strongly affected

- It has been modified to "is not strongly affected".

#24 P9.L198. Attention..recently.-→ Several studies paid attention to the emergent condition of the vegetation recently.

- It has been edited.

#25 P9.L199. In this part...were compared. → How do you do this exactly? You fit equation 1 for alpha, and then calculate the drag coefficient Cd back with Eqs 2 and 3?

- Yes. The typical process to get the drag coefficient by the calibration method is like this: measure the local wave height H(X) through the vegetated area then calibrate the value of alpha or *k* by Eqs. (7) or (8). Then Cd can be calculated by equations such as Eqs. (2), (3), (5). This is the calibrated value of Cd. Then the authors often relate the calibrated Cd to Re or KC, so the Cd is predictable when lack of measurement data. It has been modified:

“Both methods by Dean (1979) and Dalrymple et al. (1984) consider wave height decaying by the reciprocal function, in which the damping factor can be calibrated by local wave height. In this case, the value of the drag coefficient can be calculated using Eq. (2) or Eq. (3), and the comparison of results by these two equations is shown in Fig. 4.”

#26 P9.L204. When study → when studying

- It has been edited.

#27 P9.L213. Decaying function → decaying functions

- It has been edited.

#28 P11.L223. How did you determine k here?

- k is obtained by calibrating the measured wave height through the vegetation by Eq. (8). This sentence has been modified:

“The new method obtains the damping factor α' by using the calibrated k' based on measured wave height and Eq. (12), so the drag coefficient C_D can be calculated by Eq. (3).”

#29 P11.L224. Decaying → decays

- It has been edited.

#30 P12.L237. Different densities → what do you mean here?

- Different stem densities had been constructed in the study by Hu et al. (2014) and this research. This sentence has been modified:

In the study by Hu et al. (2014) and this research, cases are grouped by different densities

#31 P12.L238. Why are these considered as outliers?

- Experiments can have errors sometimes. I have revisited the original observations, the difference between Cd values from parallel experiments is relatively large for these two cases. Other symbols can also be outliers and they may affect the regression of data to some extent. This is unavoidable for experimental studies. We did not look into the outliers further, those two are just especially obvious. This sentence has been modified:

“These two trigons in the lower left corner were considered experimental outliers in these analyses.”

#32 P12.L238. Tendencies → what do you mean with tendencies here?

- The original sentence has been edited:

"Results shows that for different groups of cases as the legend specified, there are obvious trend lines."

#33 P12.L240. Due to → be due to

- It has been deleted.

#34 P12.L240. wave → waves

- It has been deleted.

#35 P12.L240. This might...were small. → This sounds like a bit of guessing, but you should be able to check this.

- This sentence has been deleted.

#36 P12.L240. Results revealed...was ignorable. → How do I see this? Which density differences?

- Different stem densities had been constructed in the study by Hu et al. (2014) and this research. And the results had been separated in Fig. 7, see as VD1, VD2, VD3 for Hu et al. (2014) and N1, N2 for this research.

- Figure 7 have been edited (see the following figure) and the emergent condition of the cases can also be seen easily. Further, the calculated value of Cd by an equation from Wu et al. (2011) has been added in this figure to compare with our results.

- Additional Reference:
- He, F., Chen, J., Jiang C.: Surface wave attenuation by vegetation with the stem, root and canopy, Coast. Eng., 152, 103509, https://doi.org/10.1016/j.coastaleng.2019.103509, 2019.

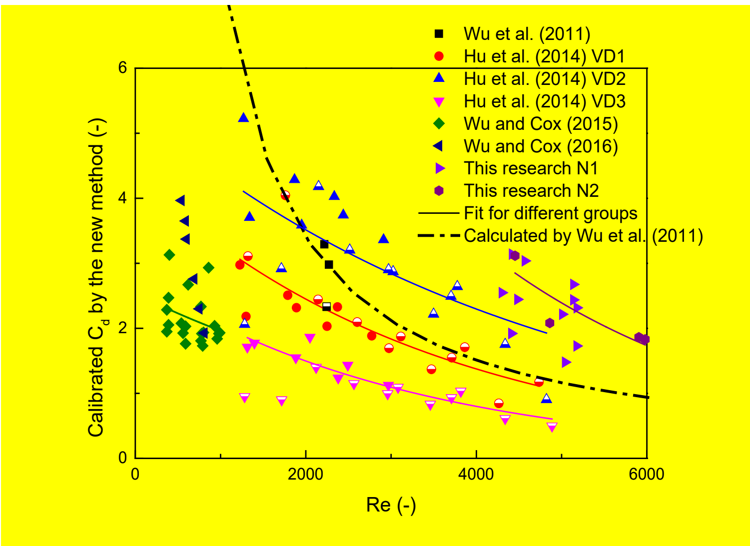

Figure 7: Relation between R_e and the calculated C_D by the new method. Different symbols indicate cases from different researches, and partially and fully solid symbols denote submerged and emerged cases, respectively. The solid lines following groups of the symbols indicate nonlinear fit by Eq. (13). The dashed dot line shows the calculated values by Eq. (15).

- The following paragraph has been added at the end of Section 2 and Fig. 8 has been modified:

Researchers had reported several formulas between C_D and Re. For instance, Wu et al. (2011) obtained the following empirical equation:

$$C_d = 3.83 \times 10^{-6} + (5683/Re)^{1.17} \quad (15)$$

Meanwhile, He et al. (2019) revealed that

$$C_d = 18.025 \exp(-0.043KC) \quad (16)$$

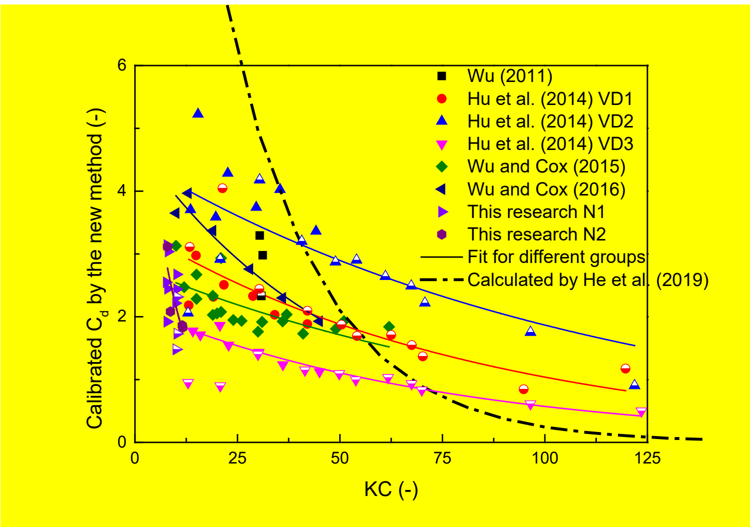

Figure 8: Relation between KC and the calculated C_D by the new method. Details are the same as Fig. 7.

#37 P12.L245. Various groups → do you mean the groups in Table 2? Please be specific.

- "varies groups" has been changed to "varies groups in Table 3".

#38 P12.L247. Case study is → case studies are?

- It has been edited.

#39 P15.L275. By reciprocal → by a reciprocal

- It has been edited.

#40 P15.L275. By combining...two perspectives. → These two reliable calibration methods by Dean (1979) and Kobayashi et al. (1993) can be combined from two perspectives:

- It has been edited.

#41 P15.L277. These relations → the relations

- It has been edited.

#42 P15.L300. Filed → field?

- Yes. It has been edited.

- Additional Reference:
- He, F., Chen, J., Jiang C.: Surface wave attenuation by vegetation with the stem, root and canopy, Coast. Eng., 152, 103509, https://doi.org/10.1016/j.coastaleng.2019.103509, 2019.