Review of: "Fractional-order LCL filters: principle, frequency characteristics, and their analysis"

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Fractional-order LCL filters: principle, frequency characteristics, and their analysis

Frequency domain analysis of a fractional-order LCL (FOLCL) filter is given in this paper. Although FOLCL was introduced in the literature, the detailed frequency domain analysis is carried out in this paper, as claimed by the authors. They have proposed the necessary and sufficient condition as the sum of fractional orders equals two, as the condition for resonance in the FOLCL.

The paper has contributions. However, some minor modifications are needed before a final decision about the acceptance of the paper is made.

The following observations may be helpful to review and revise the paper.

1. Throughout the paper, both the UK and the USA spellings are used. Please use either one.
2. In so many places, there are issues with punctuation, especially comma. There must not be a space before a punctuation, but there must be a space after a punctuation.
3. The word "constructed" is misleading in the paper. It may be replaced by "simulated".
4. Rewrite the sentence, "… and the orders of some capacitors such as super-capacitors were verified may be much faraway from 1 by experiments [27]."
5. "Theoretical analysis and numerical simulations show that the filter provides wider bandwidth to mitigate higher-order resonant **frequencies** than its integer-order counterpart." Do we get resonance at many frequencies?
6. In (6), may be replaced by) for better clarity. Use this bracket () in all subsequent equations also.
7. One/ two intermediate steps may be added between (9) and (10)/ (11).
8. Property 2: "… The resonant frequency is only determined by the values of , and , and is independent of the order α of the FOIs and the order β of the FOC." Please check and correct since this is valid when .
9. Equation (22): The conditions given as and are misleading since these are not used in deriving these two equations. All subsequent equations may be corrected accordingly. After (22), further equations may be rewritten (already derived) under two categories; when and .
10.   After (32): Besides, considering that there is when then Why do we require the highlighted condition?
11. Section 3.4: Is there any other definition of phase crossover frequency? If not, the word 'usually' may be dropped. It is valid for the definition of gain crossover frequency also.
12. Show some intermediate steps between (45) and (46).

13. Notations for 'phase crossover frequency' and 'gain crossover frequency' may be, respectively, changed to and .

14. Property 5: Is the condition needed here?

15. Correct the typo in the third line of (48).

16. Show some intermediate steps between (50) and (51).

17. "… the differential evolution (DE) algorithm [43] to solve equation (49) …" Is it (49) or (51)? Please check and correct.

18. "Fig. 3 shows the change diagram …". Please avoid starting a sentence with Fig. Use the full form. What is the change diagram? Is it a technical term?

19. "when which makes the log magnitude-frequency characteristic curve cross the 0dB line many times." It is not clear from Fig. 3 how many times it crosses the 0 dB line for a particular combination of and satisfying

20. From Figs. 4 and 5, please specify the exact number of times the log magnitude-frequency curve crosses the 0 dB line, instead of writing it as many times. Also discuss, how to find phase margin in such a case.

21. The numerical values mentioned in the paper using Figs. 4 and 5 are difficult to observe from the figures. The respective portion of the figures may be amplified.

22. Table I and Table II: Physical interpretations are essential here. Why, for some combinations of and , the GM and PM are both positive or both negative? A column may be added showing the stability of the FOLCL for all combinations of and with physical interpretations.

23. There are a few grammatical issues. Please check and correct.

24. Mathematical equations are not visible above. So, please see the pdf file in the supplementary data.