

Response to Reviewer 2

Review
Summary: The authors present a fuzzy logic approach to control the flow and overall pressure of oxygen and hydrogen gas, thus controlling the output voltage. <u>Author response:</u> We have added exposure to fuzzy logic controls to the text (point 2.2.3 control design). These additions are line 137 in the revised text
Broad comments: The introduction does not say anything about the significance of the current work. How novel or different This than other approaches. It does not mention anything about the current industrial standard employed for such controls. The authors described what is SOFC but failed to say anything about current output voltage controlling approaches — no clear hypothesis presented in the introduction — no mention of what kind of valve used in controlling H₂ and O₂ gas in SOFC. It is not mentioned that how managing the output voltage would impact the SOFC performance. The authors provided no background and significance of these equations included in the text. Equations are disturbing the continuity of the flow. Authors need to explain a bit about the theory behind proposing those equations in the context of SOFC. The conclusion should be rewritten. The graphs presented in the text looks like a lab report presentation. <u>Author response:</u> We have added preliminary reviews in relation to previous methods and research. All of these studies are still in the form of simulation software such as MATLAB. The review is at lines 31, 37, 44, 48, 55, 64. Furthermore, it relates to our reasons for the topic of this paper. We have also fixed the pictures / graphics from line 359. For the valve model is the orifice. I enter the explanation in the script at line 225

Abstract:

Line 11-12: Complex sentence. Split into two parts.

Author response:

We have fixed lines 11-12 to "Research has shown the importance of SOFC control. Voltage output control is needed because of nonlinearity, slow dynamics, and proper SOFC operating restrictions"

Abstract:

Line 14: What is the name of the previous model. Mention it. Article abstract should provide a more precise explanation regarding what is done in the specific research. Avoid vague sentences.

Author response:

We have omitted this sentence in the abstract. The linkages of previous research have been described in the introduction

Abstract:

Line 15-16: “ fuzzy logic control method which has a firm value in determining the angle of rotation.” Is it fuzzy logic providing a firm valuation of the proposed method of determining the angle of rotation? It is not clear.

Author response:

For this line we update the sentence with: "This study aims to design an SOFC simulator with voltage output control to optimize the flow rate of fuel (hydrogen) and water (oxygen). This SOFC simulator is designed based on a microcontroller model. The controller is designed using the fuzzy logic method "(lines 12-15).

Abstract:

Line 17: The result shows that the output voltage can reach the set point with the average value is 334,73 volt. What is the purpose of this

sentence? The authors should mention that setpoints achieved by varying angles of rotation in what order.

Line 17 and 18: The average voltage values are different? Is it 334,73 or 334.73V? Both are different. The average output voltage mentioned in the abstract not mentioned anywhere in the text.

Author response:

In this line the correct value is 340.6. Set points are the specified reference voltage

What is V_{act} , V_{ohmic} , V_{conc} ? Also, partial pressure symbols were not defined. Table 1 A lot of variables used not explained in the text. What “I” representing? Is it similar to I_r

What is E_{cell} , N_{cell} ?

Author response:

Can be seen on line 348

I is the current that occurs at the SOFC load or output current. In SOFC simulators this current must be assumed. Assumed as an input current (external) as in Figure 1.

E_{cell} is the Nernst voltage equation, in reality it is the ideal voltage for SOFC cells without loss.

N_{cell} is the number of cells inserted into the SOFC stack

Authors need to have a better color choice and use clear X and Y-axis. It looks like authors used Excel for preparing graphs. Many high-quality figures can be arranged via Excel. Also, for charts, line thickness should be the same. Omit using grid lines.

Some graphs are presented with 100 per moving average; some of the charts are having 50 per mov. Avg. Please make it the same and present.

Author response:

We have also repaired this section and can be seen starting on line 359