We would like to thank the Anonymous Referee #1 for the constructive comments concerning our article. These comments are all valuable and helpful for improving our article. According to the comments, we have tried our best to revise our manuscript. In this response letter, we have replied (in blue) to all the comments formulated by the Referee #1(in black).

Reply on RC1

The paper introduces the development of a multifield rock resistivity test system, which is of significance for studying the mechanical and electrical properties of rock under THMC conditions. The sealing methods for preventing the effect of water film on the testing result of resistivity were also discussed. Publication is recommended after the following minor revisions:

Our reply: We thank you for your comments and suggestions to improve the manuscript. The point by point response to all the comments and suggestions is provided in the following sections.

1. Section 5.1, the photo of engraved granite sample, as well as the size and location of the fracture are suggested to be given in the manuscript.

Our reply: Thank you for your advice. We added the photo of engraved granite sample as Figure 9 in the manuscript. The fracture in the specimen is a single fracture running from top to bottom, basically in the middle of the specimen section, and the initial average opening of the fracture is 0.1mm.

2. Section 5.1, Granite is very dense, and how to determine it is saturated?

Our reply: The saturation of granite specimens was carried out by reference to the vacuum pumping method in the *Standard for Test Methods of Engineering Rock Masses* (China standard GB/T50266-2013). First, the specimen was put into the vacuum barrel and pumped for 4h. Then, the prepared solution was injected into the vacuum barrel to make the liquid level higher than the specimen by 1cm and continued to be pumped for

more than 4h. Finally, opened the valve and let the specimen be placed under atmospheric pressure for more than 24h. In order to verify whether this method can fully saturate the specimen, we used the same method to saturate the specimen in advance and then put it for 24h, 48h and 72h for weighing. It was found that the weight has almost no change, indicating that this method is feasible to saturate granite.

3. Section 5.2, what is the cooling and heating rate?

Our reply: Because it was impossible to measure the internal temperature of the specimen during the test, the temperature of the specimen was adjusted by controlling the temperature of the confining fluid in the triaxial pressure cell. The temperature of the confining fluid in the triaxial pressure cell can be collected in real time by the temperature sensor. In the freezing and thawing test of coal specimens, the average cooling rate of confining pressure liquid was 0.2 ℃/min, and the average heating rate was 0.3 ℃/min.

4. 10, the changing rules of unfrozen and freeze-thawed coal samples are very different, how many samples did you test? Can the authors give some explanations for this?

Our reply: Thank you for the reminder, this is very important. As a result of your suggestion, we found the deficiencies in the current experiment. The initial purpose of the triaxial test of coal under high temperature and high-low temperature cycles was to further verify the coordinated working performance of various functions of the test system, not to study the difference in resistivity between unfrozen and freeze-thaw coal specimens. Therefore, unfrozen and freeze-thaw coal specimens were tested once respectively. However, considering that the test results showed great differences between the coal specimens before and after freeze-thawing, triaxial tests were conducted again for unfrozen and freeze-thawed coal specimens according to the same test conditions. It was found that the retest results were basically consistent with the original experimental results. The radial strain of the frozen thawed coal specimen is larger than that of the unfrozen coal specimen in the process of triaxial compression,

and the resistivity decreases gradually with the increase of deviatoric stress. The test results are shown in Figure 11.

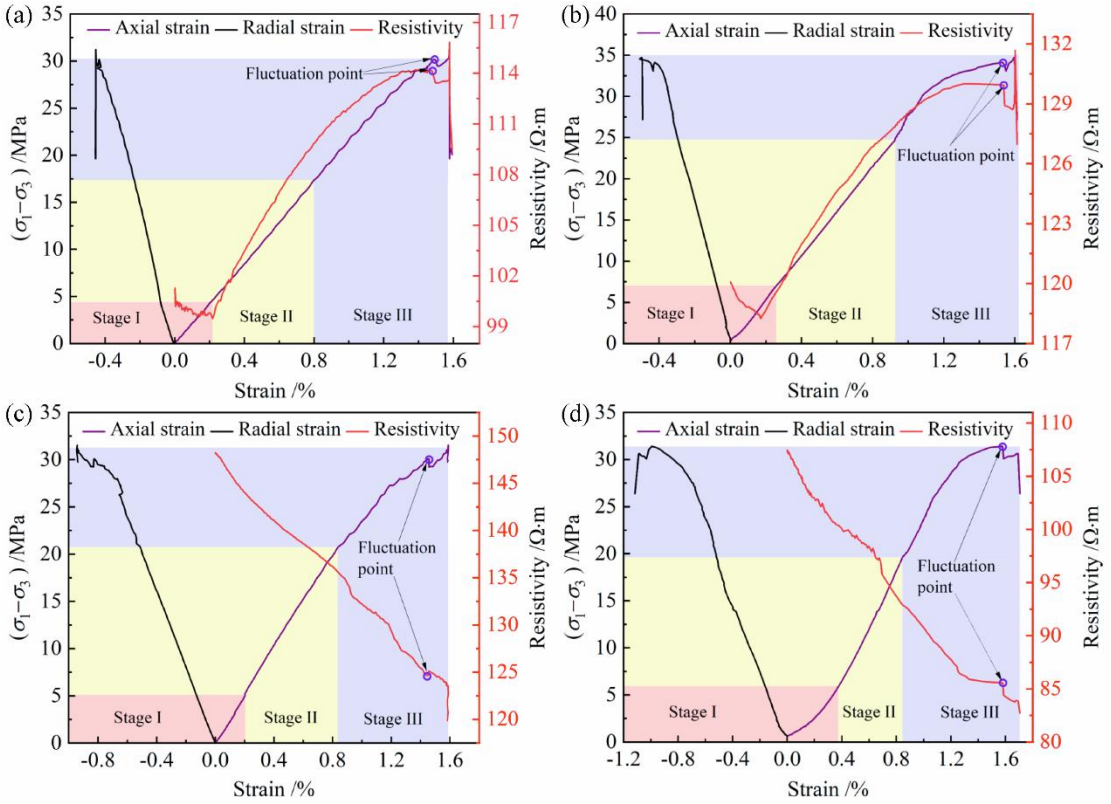

Fig. 11 curves of stress-strain and resistivity. (a), (b) Unfrozen coal specimen. (c), (b)Freeze-thawed coal specimen.

5. Paragraph 40 and 240, “onfing” should be “confing”

Our reply: Thank you for pointing out this mistake. We have corrected it.

6. Paragraph 45, “64mpa” should be “64MPa”

Our reply: Thank you for pointing out this mistake. We have corrected it.