We feel very grateful to the reviewer who has given us the valuable suggestions and comments for our paper. We have revised our manuscript accordingly.

Huayong Chen

Responses to the reviewer' comments:

Question 1: In the experiments, the size of the model is much smaller than in the reality, which leads to much smaller stress in the debris flow and check dam. How would the results change for large scaled models? Please add some discussions.

Answer: Thanks very much for the reviewer's comment. The size of a model indeed is an important parameter for experimental design. When we choose a bigger experimental model, the hydraulic phenomena or results obtained in the experiment will be closer to the data in prototype. Generally, rational model scale will be chosen to simulate the movement of debris flows or bed erosion. In our experiments, we simulated the debris flow patterns and scour features downriver of a check dam at a certain scale. As the reviewer says, the stress between the debris flows and check dam may be smaller than that in reality. However, the experimental results can still account for the interaction between the debris flows and erodible bed under certain hydraulic structure. Based on the similitude principle, the experimental results obtained in the small scaled model can be extrapolated for large scaled models. Some discussions were added in the revised manuscript (in lines 203-205, page 10;212-213, page 11).

Question 2: Page 8 line 151 The mean value of the energy dissipation rate demonstrated a good, positive correlation between the energy dissipation rate and the lateral contraction ratio. Do you mean: The mean value of the energy dissipation rate demonstrated a good positive correlation with the lateral contraction ratio.

Answer: This sentence was not good enough. It has been replaced by" The mean value of the energy dissipation rate demonstrated a good positive correlation with the lateral contraction ratio" (in line 157, Page 8).

Question 3: Page 9 line 178 The absolute error was smaller than 15.0% in most cases, as shown in Figure 11 . What means in most cases, how many percent?

Answer: The phase "In most cases" in the manuscript is not accurate enough. It has been replaced by the exact value (8.33%) calculated based on the calibration data (in line183, page 9).