

Interactive comment on “Performance Characteristics of a Small Hammer Head Pump” by Krishpersad Manohar et al.

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The comments from reviewer 1 were constructive and serve to improve the quality of the manuscript. The comments are addressed below. These changes will be incorporated in the revised manuscript.

(1) "However, it lacks some (scientific) reasoning, which should be addressed in a next version of the manuscript. General comments: - A clear objective (and knowledge gap) at the end of the introduction is missing. It should be stated what the drawbacks of the previous designs was, what the research gap is and thus the research question"

However, the delivery output of the hydraulic ram pump depends on many variables and is complicated by the three pipe flow system and the hydraulic ram effect [6].

C1

The delivery output is a non-linear relationship with variables of input head and output head. Determining the delivery output of a hydraulic ram pump at variable input and output head heights will be a critical factor in determining the applicability, suitability and effectiveness for use. This study investigates the efficiency of the hydraulic ram pump with input and delivery head height variation and quantify the change in efficiency of delivered water.

[6] Tijsseling, A. S., and Berganta, A.: Exact computation of water hammer in a three-reservoir system, Eindhoven University of Technology, CASA-Report 12-41:1-10, 2012.

(2) "do not use words like “perfect”" The automatic hydraulic ram has been used for centuries to lift water to heights over 100 meters and is considered an effective machine for 40 pumping water once certain conditions are satisfied.

(3) "explain how with “ponds”, “lakes”, and “wells”, “a form of flow can be created”" This source could be a spring, streams, river, ponds, dam, lakes and even some wells, once the conditions exist for these water sources to create a hydraulic flow head.

(4) delete “construction” Brass one-way swing valves were used.

(5) "Figure 1 the word “exhausted water” and in Figure 3 “waste water” is used. Please synchronize and avoid the word “waste water” since this has another connotation." In the revised version; the word waste water will be replaced with exhausted water throughout the manuscript.

(6) "explain to what reference the “input head” is related." The constant head supply tank was designed with a float that maintained the level as water was supplied to the inlet of the pump. The input head was the difference in height between the inlet of the pump and the water level at the top of the constant head supply tank.

(7) "117-127, not of interest, so please delete." The equations will be deleted from the revised manuscript

(8) "explain if this was to be expected (and give reference) - 140-141, explain if this was

C2

to be expected (and give reference)" The trend indicated that as the delivery height increased in increments of twice the corresponding input head, there is a 10% decrease in efficiency. This observation is in conformity with the operation of the hydraulic ram pump [7]. [7] Fatahi-Alkouhi, R., Lashkar-Ara, B., and Keramat, A.: Determine the Efficiency of Hydraulic Ram-Pumps, E-Proceedings of the 36th IAHR World Congress, The Hague, Netherlands, 28th June - 3rd July, 2015.

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