Journal Name:	**Journal of Engineering Research and Reports**
Manuscript Number:	**Ms_JERR_127641**
Title of the Manuscript:	**Analytic Determination of the Roller Length of a Hydraulic Jump in an Open Channel Flow using a Bouncing Ball**
Type of the Article	**Article**

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PART 1: Comments

	Reviewer's comment	**Author's Feedback** *(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Please write a few sentences regarding the importance of this manuscript for the scientific community. A minimum of 3-4 sentences may be required for this part.	In this paper, it is claimed that two numerical models are developed to calculate the roller length of a hydraulic jump in a horizontal open channel flow using a bouncing ball. Then, it is said that the developed models are verified in comparison with obtained experimental data. The generated model would be instructive to be used in modeling software for design of hydraulic structures, prediction of hydraulic jump length in stilling basins after gates as well as in downstream diversion dams and spillways.	
Is the title of the article suitable? **(If not please suggest an alternative title)**	The title is not coinciding with the work done in this paper. In both 'Abstract' and 'Results and Discussions', it is claimed that numerical models are developed for the computation of roller length of hydraulic jump, however the title starts with "Analytic Determination …" . Additionally, it is stated that a bouncing ball is used but the bouncing ball characteristics are not given anywhere in the manuscript neither in methodology nor in the numerical modelling. The details are required.	
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.	There are critical inconsistencies in abstract and text: • Firstly, the range of Froude number is specified in abstract part between 2.25 and 15.96. But in the text the minimum 2.25 is never matching, it is either rounded to the interval 2 to 16 (page 3 just before the title "Uses of Hydraulic Jump") or stated to an interval starting with minimum value 2.38 (page 13, just after equation (15)). Even, the minimum value 2.25 stated in abstract is not observed in the figure captions through the pages 14 to 19. The minimum value is noted as 2.26, not 2.25. • Latter, the results in abstract are not clear and are not presented in sufficient detail in the text. It is understood from the line 10 of the abstract "The models were then verified with the experimental data obtained in a large-size facilities." that the authors obtained the experimental data by their own. However, they did not. An appropriate version of this sentence might be "The models were then verified with the existing/available experimental data obtained in large-size facilities.[citation(s)] ". • There is no computation and no explanation related to the Pearson correlation coefficient in the text. The range of this coefficient is mentioned in only one sentence in 'Abstract' and then it is repeated (page 1, last sentence of "Abstract" and page 20, last sentence of "Results and Discussion").	

Is the manuscript scientifically, correct? Please write here.	1. The manuscript is including many computational mistakes. The expressions are not equal through the pages 11-13. Additionally, there are repeated ~~expressions and it is very difficult to follo~~w the equalities since no connective symbols or words are used to relate the different statements and also to relate the consecutive equalities. Please find the correct derivation below. Computations reviewed through the pages 11-13 $\frac{Lr}{d_1} = 2.5\sqrt{\frac{g(d_2/d_1-1)}{L_r}}\ln\left(41.2\frac{d_1^2}{L_r}\frac{\sqrt{g(d_2/d_1-1)/L_r}}{11.6\upsilon}\right)\sqrt{2d_1(d_2/d_1-1)/g}$ This line is repeated in manuscript on page 11 Let $d_2/d_1 - 1 = A$ for simplicity in writing then the equation above can be rewritten as, $\frac{Lr}{d_1} = 2.5\sqrt{\frac{gA}{L_r}}\ln\left(41.2\frac{\sqrt{gA}}{11.6\upsilon}\frac{d_1^2}{\sqrt{L_r}}\right)\sqrt{\frac{2d_1A}{g}}$ Now, collect the terms L_r/d_1 to the left side of this equation and also eliminate s.t. $\sqrt{g}$ $\frac{Lr}{d_1}\sqrt{\frac{L_r}{d_1}} = 2.5\sqrt{2A^2}\ln\left(41.2\frac{\sqrt{gA}}{11.6\upsilon}\frac{d_1^2}{\sqrt{L_r}}\right)$. Here, use natural logarithm property $\ln(a.b) = \ln a + \ln b$ thus, we get $\frac{Lr}{d_1}\sqrt{\frac{L_r}{d_1}} = 2.5\sqrt{2A^2}\left(\ln\left(41.2\frac{\sqrt{gA}}{11.6\upsilon}\right) + \ln\left(\frac{d_1^2}{\sqrt{L_r}}\right)\right)$ $\Rightarrow \frac{Lr}{d_1}\sqrt{\frac{L_r}{d_1}} - 2.5\sqrt{2A^2}\ln\left(\frac{d_1^2}{\sqrt{L_r}}\right) = 2.5\sqrt{2A^2}\ln\left(41.2\frac{\sqrt{gA}}{11.6\upsilon}\right)$ Now use the properties $a\ln b = \ln b^a$ and similarly $-\ln\left(\frac{a}{b}\right) = \ln\left(\frac{b}{a}\right)$ and finally get the results $\frac{Lr}{d_1}\sqrt{\frac{L_r}{d_1}} + \ln\left(\frac{\sqrt{L_r}}{d_1^2}\right)^{2.5\sqrt{2A^2}} = 2.5\sqrt{2A^2}\ln\left(41.2\frac{\sqrt{gA}}{11.6\upsilon}\right)$ $\Rightarrow \sqrt{\left(\frac{L_r}{d_1}\right)^3} + \ln\left(\sqrt{\frac{L_r}{d_1}}.\sqrt{\frac{1}{d_1^3}}\right)^{2.5\sqrt{2A^2}} = 2.5\sqrt{2A^2}\ln\left(41.2\frac{\sqrt{gA}}{11.6\upsilon}\right)$	

$$\Rightarrow \sqrt{\left(\frac{L_r}{d_1}\right)^3} + \ln\left(\sqrt{\frac{L_r}{d_1}}.\sqrt{\frac{1}{d_1^3}}\right)^{2.5\sqrt{2A^2}} = 2.5\sqrt{2A^2}\ \ln\left(41.2\frac{\sqrt{g\left(0.5\sqrt{1+8Fr_1^2}-1.5\right)}}{11.6\upsilon}\right)$$

Note that right side of this equation is equal to the right side of Eq. (14) of author's copy but the left side is not equal to the left side of Eq. (14)

since $\ln(a.b) = \ln a + \ln b \neq (\ln a)(\ln b)$ i.e.

$$\frac{Lr}{d_1}\sqrt{\frac{L_r}{d_1}} + \ln\left(\sqrt{\frac{L_r}{d_1}}.\sqrt{\frac{1}{d_1^3}}\right)^{2.5\sqrt{2A^2}} \neq \frac{Lr}{d_1}\sqrt{\frac{L_r}{d_1}}\sqrt{ln\frac{L_r}{d_1}}\sqrt{ln\frac{1}{d_1^3}}$$

OR

$$\sqrt{\left(\frac{L_r}{d_1}\right)^3} + \ln\left(\sqrt{\frac{L_r}{d_1}}.\sqrt{\frac{1}{d_1^3}}\right)^{2.5\sqrt{2A^2}} \neq \sqrt{\left(\frac{L_r}{d_1}\right)^3}\sqrt{ln\frac{L_r}{d_1}}\sqrt{ln\frac{1}{d_1^3}}$$

Moreover, the RHS of Eq.(14) is incorrect because:

so thus,

$$A = d_2/d_1 - 1 = 0.5\sqrt{1+8Fr_1^2} - 1.5$$

Constants are computed incorrectly in the manuscript. Correct values are -3 and +4.5, respectively.

$$\Rightarrow \sqrt{2A^2} = \sqrt{2\left(0.5\sqrt{1+8Fr_1^2}-1.5\right)^2} = \sqrt{2\left(0.25(1+8Fr_1^2) - 1.5\sqrt{1+8Fr_1^2} + 2.25\right)} \neq$$

$$\sqrt{0.5(1+8Fr_1^2) + 4.5\sqrt{1+8Fr_1^2} - 4.5}$$

Therefore, the RHS of Eq. (14) should be

$$2.5\sqrt{2A^2}\ \ln\left(41.2\frac{\sqrt{g\left(0.5\sqrt{1+8Fr_1^2}-1.5\right)}}{11.6\upsilon}\right) = 2.5\sqrt{0.5(1+8Fr_1^2) - 3\sqrt{1+8Fr_1^2} + 4.5}\ \ln\left(41.2\frac{\sqrt{g\left(0.5\sqrt{1+8Fr_1^2}-1.5\right)}}{11.6\upsilon}\right)$$

Hence, the correct form of Eq. (14) is,

$$\sqrt{\left(\frac{L_r}{d_1}\right)^3} + \ln\left(\sqrt{\frac{L_r}{d_1}}.\sqrt{\frac{1}{d_1^3}}\right)^{2.5\sqrt{0.5(1+8Fr_1^2)-3\sqrt{1+8Fr_1^2}+4.5}} = 2.5\sqrt{0.5(1+8Fr_1^2) - 3\sqrt{1+8Fr_1^2} + 4.5}\ \ln\left(41.2\frac{\sqrt{g\left(0.5\sqrt{1+8Fr_1^2}-1.5\right)}}{11.6\upsilon}\right)$$

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2. The Equations (14) and (15) on page 13 are differing only in the constant multiples 2.5 and 1.0 on the right hand sides. But the left hand sides are same. How can it be? It is impossible mathematically.
3. The main difference(s) of the numerical models developed in the paper has to be clarified? How can the ranges of the Froude numbers be determined?

	4. The numerical models in (14) and (15) are **nonlinear** in the unknown $\frac{Lr}{d_1}$ so it can not be computed directly. The author should provide information about computation of $\frac{Lr}{d_1}$ so does Lr from such **nonlinear equations**. 5. The mathematical arguments are not carefully organized. Formulas and equations are not following the standard grammatical rules. There are also mathematical writing errors. e.g., • on page 2, at the end: "…in the formula: Fr = V/(gd)1/2. With a few notable…" The Froude number should be $F_r = V/(gd)^{1/2}$. • on page 7, line10: "…corresponding to 2 × 10 4 < Re < 1.6 × 10^5, where R…" 2 x 10 4 <Re should be $2 \times 10^4 < \mathrm{Re}$ 6. A photo/figure of the experimental set up is necessary. The author(s) describe an experimental set up on pages 5-7. But the description is not coinciding with the referred figure:Fig1. For example, • On page 6 on the top there is a sentence "The tank was divided by a vertical porous wall with Fig.1. Inlet to (a) channel 3 (b) channels 1 and 4". It is not clear what are "channel 3", "channels 1 and 4", "Ax", "Axj" ? • On page 7 in the section "Experimental Flow Conditions" what are h1 and h2? In Fig2 there are y1 and y2. So **parametrization of figures is not coinciding with the text.** 7. It is claimed that a bouncing ball is used for the calculation of the length of hydraulic jump. But there is **no information** about the ball characteristics. 8. Flow conditions and conditions related to the characteristics of bouncing ball are not clear and sufficient. 9. It is not figured out how accurate the obtained numerical results are. The figures are not analysed and commented on sufficiently. 10. The List of Symbols (Page 20**) is not coinciding** with the text. Too many symbols are listed but they are not mentioned in the text. e.g. There is no subscript 'a' anywhere in the text.	
Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.	• The reference list is completely different then the cited works in the text. And it is the same list with all its misprints and errors of the paper linked through https://www.academia.edu/81308381/New_equation_for_roller_length_of_hydraulic_jump_in_a_stepped_spillway . Even the order is same. • The introductory literature review is not sufficient and not up-to-date. • The author(s) listed the existing experimental results in Table 1 but the citations are completely missing in the reference list. None of the citations in the table are in the reference list at the end of the manuscript. • The reference style is not uniform. A few citations appeared like [6,8] , [4]. All the others (which are not in the reference list but cited in the text) are like "Rouse et al. (1959)". • The reference list as well as the whole manuscript is full of misprints, punctuation and lexical errors. And also lowercase, uppercase, capitalization is not uniform.	

Review Form 3

Is the language/English quality of the article suitable for scholarly communications?	The manuscript has to be rewritten completely and proofread. Actually, I observed several grammatical errors but rather than those, there are numerous fundamental errors to be pointed out. **Especially, due to the mathematical errors, computational errors, lack of necessary data, technical flaws and writing deficiencies, the accuracy of the visualized results in the figures are not reliable.**	
Optional/General comments	• Mainly, the sentences does not flow smoothly, there should be a definite rhythm between sentences and so any two sections. • Word-by-word repeated sentences and even repeated paragraphs are included e.g. on page 1, lines 8-12 are same in both 'Abstract' and 'Results and Discussion'. On page 1 , lines 9-11 of introduction part is repeated on page 3, lines 3-5 without changing any word etc. • The subsections (Energy Dissipation, Sediment Transport and Water Treatment) of the two sections "Uses of Hydraulic Jump" and "Effect of Hydraulic Jump" are exactly the same. Why are they repeated? • Besides, on page 3 'Energy Dissipation' is listed at first as one the applications, On page 4 with same sentences it is listed again at first as one of the significant effects, On page 5 under same section it is again mentioned on line 13 as "Energy dissipation is yet another application …". • Not all the equations and formulas are numbered. Also, some sections do not have section numbers (sections on pages 3-7). • Figures 1,2 and 3 are copy&pasted from somewhere but the sources are not cited. • In Figures 4a through 4g, the comparison between measured and estimated results are visualized but the citations of the measured results are missing.	

PART 2:

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

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