Hindawi
Complexity
Volume 2020, Article ID 6537105, 2 pages
https://doi.org/10.1155/2020/6537105

*Corrigendum*

# Corrigendum to "Multiobjective Optimization Design and Experimental Investigation on the Axial Flow Pump with Orthogonal Test Approach"

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Received 22 October 2020; Accepted 22 October 2020; Published 9 November 2020



The article titled "Multiobjective Optimization Design and Experimental Investigation on the Axial Flow Pump with Orthogonal Test Approach" [1] extends the results of an article by the same authors published in Chinese [2], though the earlier article was not cited and the authorship differed.

The authors apologized for the lack of citation and explained that the aim and conclusion of the earlier article [2] were limited as it was not clear how the pump behaved under optimal conditions. The authors decided to work with additional collaborators on a new methodology. Based on the optimized pump model provided by [2], the article [1] focused on pump performance under variable rotational speed. Therefore, the tables and figures have a greater range of test results than the previous article. In the new article [1], a new simulation of the same pump model with different turbulence models was conducted. Also, a mesh refinement study was carried out.

Yuquan Zhang, Yanhe Xu, E. Fernandez Rodriguez, and Jue Wang were added as authors, and Wenqing Jiang, Canhua Zhou, and Yujie Chen were removed. The authors explained that the work in each article was completed by the same team supervised by Prof. Yuan Zheng. The authors decided to augment the earlier research published in Chinese and present it to an English-speaking audience, only citing references in English, with the agreement of all the authors of the two articles. At the time of publication of the earlier article [2], Yuquan Zhang was still a Ph.D. student of Prof. Zheng, and he taught Aoran Sun (a Master's student) the methodology for the analysis of the flow field of the numerical simulation and agreed not to be an author on the earlier work. He led the team conducting the new simulation with different turbulence, and Yanhe Xu conceptualized the new study.

Many of the figures and tables were duplicated. Since the same pump was used, the description of the geometry was the same in Tables 1 and 2 in each article. In the new article, Figures 2 and 4 were about the description of the pump model and the methods in these two articles, Tables 5–7 showed the preliminary results of the calculations based on the same methods, which lay the foundation for the further optimization and study of pump performance under variable rotational speed, and Figures 5–8 showed the flow pattern and pressure pulsation results of the optimized pump, which is a validation for the model used in the two articles. In the new article [1], these figures were plotted using a new simulation with different turbulence models and calculation methods, as indicated in Section 3.1, "Simulation Methodology." The mesh refinement study was carried out in the new article as shown in Tables 3 and 4. Table 8 was supplemented to show the optimization scheme of the comprehensive frequency analysis. Figures 9 and 10 described the experimental facilities, because the same experimental apparatus and pump model were used. New experiments of pump efficiency and performance under variable rotational speed were conducted in article [1]. Thus, Figure 11 illustrated the validation of the numerical data of the pump by experiments, and Figure 12 gave improved experimental results of the comprehensive characteristic curve and a supplementary description of pump performance under the design operating conditions. The most important contribution of the new article [1] was provided by the results for pump performance under variable rotational speed, which were shown in Table 9 and Figures 13 and 14.

The introduction was rewritten to cover the further studies in the latest article. Six different rotational speed conditions in the optimal operating points were numerically calculated in order to explore the internal hydraulic characteristics of the optimized axial flow pump. Hydraulic performance of the flow passage and hydraulic performance of the blade inlet and outlet section were studied in detail, as shown in Table 9 and Figures 13 and 14. It was found that, in general, the decrease in rotational speed caused a larger hydraulic loss ratio and smaller blade efficiencies. The hydraulic loss ratio of the blade inlet section was the smallest, and of the guide vane, the largest among the hydraulic loss ratios of each pump section. The change of rotational speed had the greatest influence on the guide vane section. Compared to the velocity circulation at the blade inlet section, the increase of velocity circulation at the blade outlet section was significant due to the blade rotation, and this was in direct proportion to the rotational speed.

## References

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