# Assessment of turbine stages and blade numbers on modified 3D Savonius hydrokinetic turbine performance using CFD analysis

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| **Abstract** | Purpose In Southeast Asia, the renewable energy produced from hydropower systems has significant potential. Therefore, adequate development is needed to prevent future energy-related crises. This study, therefore, aims to determine the variations effects in geometry and the geometrical factors on turbine performance. Design/methodology/approach The developed aspects are selected to determine the blade shape, its number and multistage requirements. The study was conducted in 3D simulation, with Ansys software used to calculate a series of computational fluid dynamic problems. The aspect ratio applied in this study utilized the ratio of the overall diameter of the rotor height (D/H), which is 1. Findings The results showed that the highestC(p-max)value, number of blades and stages were 0.2, two and three, respectively. Furthermore, these attributes combined to improve the performance of hydroturbines. Research limitations/implications The research was fully conducted using numerical simulation, which requires sustainable research in the form of laboratory experiments. Also, pioneer experiments were conducted using benchmarking to ensure the results obtained are reliable. Practical implications Hydropower is one of the best renewable energy sources in Indonesia with a large potential in the archipelago and tropical countries due to rivers and various water sources. The current generated is a useful reference for Savonius design. Originality/value The originality of this study is to examine the three aspects of the geometry of the rotor, such as the number and shape of blades, as well as the stages in the same boundary conditions. Therefore, the comparison of the effects of changes in geometry on turbine performance is more acceptable and complete compared to the pioneer works, which focused on a parameter. This research combines several aspects to determine the effect of rivers and various water sources on the hydroturbine. |
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