

## عنوان مقاله:

Experimental Investigation on the Effect of Flow Rate and Load on the Hydrodynamic Behavior and Performance of an Archimedes Screw Turbine

## محل انتشار:

ماهنامه بین المللی مهندسی، دوره 36، شماره 4 (سال: 1402)

تعداد صفحات اصل مقاله: 13

## نویسندگان:

M. Zamani - *Sea-Based Energy Research group, Babol Noshirvani University, Babol, Iran*

R. Shafaghat - *Sea-Based Energy Research group, Babol Noshirvani University, Babol, Iran*

B. Alizadeh Kharkehi - *Sea-Based Energy Research group, Babol Noshirvani University, Babol, Iran*

## خلاصه مقاله:

One of the best solutions to overcome problems caused by fossil fuel consumption is using renewable energy. In this research, effect of flow rate and load on the performance of an Archimedes turbine was experimentally studied. At first, Archimedes turbine with optimal size was made using 3D printer technology. Then it was placed in the river simulation setup. After the calibration and uncertainty analysis, tests were performed for three flow rates and five electrical resistances. The results showed that increasing the flow rate leads to a rise in power, torque, and angular velocity of the turbine, but it leads to a non-linear behavior in efficiency. On the other hand, an increase in electrical load has also led to a decrease in converter performance for all conditions. In addition, by implementing  $\pi$ -Buckingham theory, the converter's hydrodynamic behavior was studied by using Reynolds numbers, dimensionless flow, and power coefficient. The results showed that an increase in Reynolds number leads to a decrease in power coefficient. However, an increase in dimensionless flow increases the power coefficient first and then decreases (nonlinear behavior). In addition, the Archimedes screw turbine was also studied from an economic point of view, and the results showed that increasing discount rate leads to an increase in discounted payback period, and in the worst case, the payback period is ۳.۰۹ years, and in the best case, it is ۱.۶ years. Also, the construction of the Archimedean screw turbine in Iran can save currency for ۱۴۳۹.۵.

## کلمات کلیدی:

Hydro Power, Experimental study, Archimedes screw turbine, performance, Economic Analysis

## لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1646074>

