

Experimental design and analysis of pump as turbine for microhydro system

ABSTRACT

Pump as Turbine (PAT) is typically used as electromechanical components in microhydro systems, especially by rural communities in developing countries to reduce initial capital cost. The technology is readily available and easily accessible compared to commercially available turbines. The aim of this paper is to present the experimental design and analysis of PAT for microhydro systems over a range of rotational speeds. An end suction centrifugal pump was tested by inverting the flow across the pump. The rotational speed of the impeller was controlled by manipulating the braking force applied to the output shaft. The corresponding flow rate, pressure, and torque were recorded and presented. The experiment results show that the centrifugal pump can operate in turbine modes without any modification on mechanical components with the highest efficiency of 65.04%; however, at off-design operation, the efficiency decreases significantly due to unmatched flow velocity with the wall boundaries inside the pump.