

Abstract

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CFD Simulation of Water Gravitation Vortex Pool Flow for Mini Hy ower Plants

Mini hy ower plants can be expected to have a good potential to provide electricity to remote communities. An important part of this economic and clean energy system is the conversion of the low-head potential energy into kinetic energy to drive the power turbines. One way of converting the low-head potential energy is using a gravitation vortex pool. This paper describes work to optimize the vortex pool to improve energy conversion and hence generate electricity from low heads of between 0.7 m to 3 m. The commercial Computational Fluid Dynamics (CFD) code ANSYS Fluent was used in this study to investigate the optimum configuration of the vortex pool system. The free surface flow of this system was mathematically described. A parametric study was carried out using the software to determine the main parameters affecting the efficiency of the energy conversion. This parametric study utilized Fluent, which focused on the effect of changing water depth and outlet diameter on inlet/outlet speed which is novel approach. The results from this study could help in the investigation of the optimum configuration of the vortex pool system.