Improving power output prediction from ocean salinity and temperature energy converter using viscosity model

ABSTRACT

Salinity difference between fluids can be utilized and converted to useful power through an underwater hydroelectric power unit, Hydrocratic Generator. The generator system relies on the difference between the osmotic pressure of the incoming fresh water from on-ground reservoir, and the surrounding sea water in the system. In this investigation, additional parameter is introduced which is the temperature difference between fluids; hence the system is known as Ocean Salinity and Temperature Energy Conversion System (OSTEC). With the classical Density Model, there is over estimation of the predicted power output if compared to the experimental power output. Backward numerical extrapolation is performed on the experimental flow rate and found that the experimental water head of incoming water is significantly lower than the theoretical water head. This indicated that the experimental water head of incoming water does sustain a certain amount of head losing during the testing. As a consequence to minimize the prediction error, a refined prediction model is formulated by incorporating the effects of frictional head loss and head loss causing by the number of pipe fittings. Computer simulations are presented in this paper to assess the system as the parameters of system are varied using the refined prediction model.