Numerical Analysis of Energy Converter for Wave Energy Power Generation-Pendulum System

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Abstract	The wave energy power generation-pendulum system (WEPG-PS) is a four-wheeled instrument designed to convert wave power into electric energy. The first wheel is connected to the pendulum by a double freewheel, the second and third are ordinary wheels, while the fourth is a converter component that is axially connected to the electric generator. This design used the Euler-Lagrange formalism and Runge-Kutta method to examine an ideal dimension and determine the numerical solution of the equation of motion related to the rotation speed of the wheels. The result showed that the WEPG-PS' converter system rotated properly when its mass, length, and moment of inertia are 10 kg, 2.0 m, and 0.25 kgm(2), respectively. This is in addition to when the radius of the first, second, third, and fourth wheels are 0.5, 0.4, 0.2, and 0.01 m, with inertia values of 0.005, 0.004, 0.003, and 0.1 kgm(2). The converter system has the ability to rotate the fourth wheel, which acts as the handle of an electric generator at an angular frequency of approximately 500 - 600 rad/s. The converter system is optimally rotated when driven by a minimum force of 5 N and maximum friction of 0.05. Therefore, the system is used to generate electricity at an amplitude of 0.3 - 0.61 m, 220 V with 50 Hz. Besides, the lower rotation speed and frequency of the energy converter of the WEPG-PS (300 rad/s) and induction generator (50 Hz) were able to generate electric power of 7.5 kW. (c) 2020. CBIORE-IJRED. All rights reserved
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