

ABSTRACT

A Performance Analysis of a Double Acting Wave Pump

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A theoretical analysis of a lever enhanced double acting wave pump is presented. Pump performance is analysed using the linear wave theory, and a mathematical model of the system is developed. A linear second order differential equation results, for which a closed form heaving solution is obtained. This heaving equation is solved numerically.

It is shown that a pump optimized for Eastern Caribbean wave conditions can realize a hydraulic power output of $53.7kW$ at 31.2% efficiency, and can handle $26.6m^3/hour$ of water at a pressure of $7.26MPa$. The capacity of the lever enhanced wave pump is comparable to that of other extant wave pumps indicating its feasibility for reverse osmosis desalination purposes.

For maximum loading conditions ($p = 7.26MPa$) the wave pump produces a greater power output than a regular unimpaired heaving device with the same dimensions.

Keywords: Wave Pump, Sea Water Reverse Osmosis, Wave Powered Desalination, Wave Energy, Linear Wave Theory.