Ocean Energy

Ocean energy is emerging as a vital solution in the global pursuit of sustainable energy, particularly as countries, including Taiwan, work towards achieving net-zero emissions by 2050. In this special topic of ocean energy, three excellent papers are presented.

Chen et al. (2024) highlight a piezoelectric wave energy harvester (PWEH) that integrates a unidirectional rotation mechanism with piezoelectric power generation components using buoys with added mass. By optimizing the structural configuration of the buoy and increasing its mass, the buoy's inherent frequency is adjusted to synchronize with the oscillation of the waves.

Wang et al. (2024) focus on the maximum power point tracking (MPPT) of a point-absorber wave energy converter (PA-WEC) under irregular wave conditions. Both numerical simulations and experiments demonstrated that optimal PTO damping exists for each wave condition, significantly influencing power output. These findings provide essential insights for designing MPPT algorithms and enhancing power efficiency for PA-WECs.

Chen et al. (2024) investigate the performance of a dual-stage organic Rankine cycle system, which is recognized as one of the promising configurations for ocean thermal energy conversion (OTEC) applications due to its enhanced efficiency in utilizing temperature differentials. A sensitivity analysis was conducted on 13 different working fluids to evaluate the impact of critical parameters on system performance, including seawater pipe diameter, pinch point temperature, and working fluid mass flow rate.

These studies provide diverse perspectives on ocean energy, exploring its technological development and application potential. The scientific insights gained from this research offer valuable guidance for governments and relevant organizations to formulate effective policies and strategies, promoting the sustainable development of ocean energy and laying the foundation for future energy transitions.

Best regards,

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