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Sea Wave Energy Estimating in front of the Iraqi Coast, Northwest Arabian Gulf

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Abstract:

The world is turning to alternative energies (wind energy, solar energy, and seawater energy) as eco-friendly and renewable energy. The monthly and seasonal averages of the sea wave energy (i.e., total and characteristic wave energy) were studied in the northwest Arabian Gulf in front of the Iraqi coast in the OUTER BAR. A mathematical analysis was conducted for 3560 wind speed values (2015-2024). The results showed that the total energy of the sea wave was limited between the two values 55.42 and 581.19 (Joules/m²), while the characteristic wave energy was restricted between 102.09 and 2855.87 (Joules/m²). Also, the seasonal wave energy is within the range of 73.84 - 423.53 (Joules/m²), and the seasonal wave energy median is within the range of 116.87-1579.21 (Joules/m²). The standard

deviation value σ was also determined, which reflects the extent of energy dispersion around the seasonal peak. The results may provide future insights into how sea structures and barriers are built when these calculations are used appropriately.

Keywords: Northwest Arabian Gulf, significant wave energy, wave energy, wave characteristics.

1. Introduction:

Excessive energy consumption and greenhouse gas emissions have contributed to increased global warming. The world primarily relies on nonrenewable energy resources, such as oil, gas, and coal. However, it is currently studying alternatives such as wind, solar, and geothermal, as well as water energy, including sea wave or ocean wave energy, and hence the possibility of benefiting from it as one of the best alternatives to minimise the negative effects of increased global warming. Wave energy resources offer the highest energy density, or amount of stored energy in a particular region, when compared to other renewable energy resources. Geographically, Iraq lies in West Asia and is partially encircled by the Arabian Gulf, with a