

Wave-measuring performance characteristics of Spoondrift Spotter

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In support of active control systems for wave energy converters (WECs), Integral Consulting Inc. performed a series of tests with the Spoondrift Spotter, a low-cost, solar powered wave buoy platform recently developed by Spoondrift. The availability of a high-fidelity, low-cost wave measuring platform will benefit active tuning of WECs, in addition to providing safety and a monitoring capability.

To validate the data quality of the Spotter platform, we consider a series of tests, including comparisons with prescribed wave motions (monochromatic and random waves) on a custom-built wave motion validation stand, and simultaneous in-water measurements using a conventional wave measurement buoy, the Datawell DWR-G4. Comparisons include time domain validation (i.e. wave-by-wave) and comparisons of wave spectra, directional moments, and other spectral quantities (including bulk statistics such as significant wave height, peak period, mean wave direction and directional spread). Spotter measurements show excellent fidelity lending a high degree of confidence in Spotter data quality.

To study ocean wave decorrelation length scales, and assess the ability to measure those with arrays of free-drifting wave buoys, a series of tests were conducted in the Santa Barbara Channel, California. Two Spotter buoys were spaced at varying distances ranging from 30 m to 300 m, following which one Spotter was allowed to freely drift away from a moored Spotter. Decorrelation scales, wave speeds and Doppler shifts were determined from these measurements and compared to theoretical predictions. The good agreement between predictions and observations confirms that these wave characteristics can be directly measured using free-drifting, high-fidelity instruments.

Future work includes the development of an integrated underwater sound measurement system based on the Spotter platform. In partnership with Spoondrift, Noise Control Engineering, H. T. Harvey & Associates, and Sandia National Laboratories, this effort will characterize and geo-locate noises from Marine Hydrokinetic devices and the surrounding environment.

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