

Accounting for Current in Wave Buoy Measurements

Investigators

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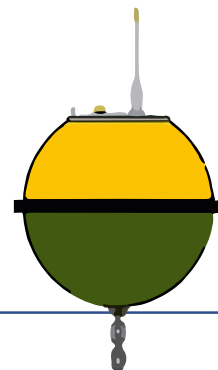
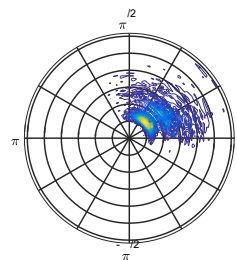
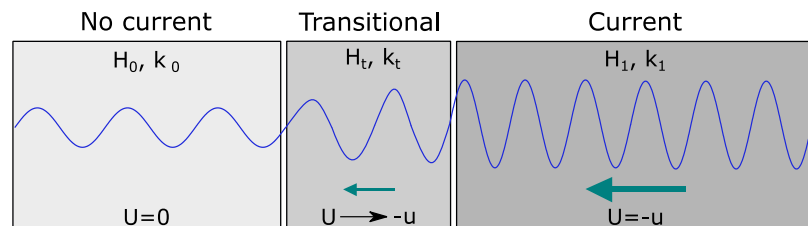
Objectives

1. Quantify Errors introduced by current
2. Account for current in buoy analysis approach

Background

Unknown current introduces errors:

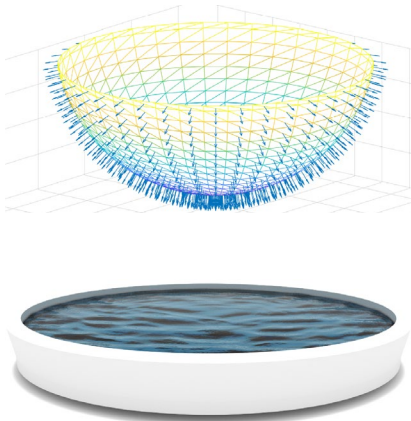
- Wave climate misrepresented
- Errors in wave direction
- Alteration to buoy dynamics



Accounting for Current in Wave Buoy Measurements

Obtain Buoy
Transfer Functions
in Current

Account for modified
dispersion relation and
mooring dynamics



Develop new buoy
analysis approach to
account for current

Include modified
transfer functions &
estimate current

$$C_{1,1}(f) = \int_0^{2\pi} T_1^2(f, \vec{U}(\theta)) E(f, \theta) d\theta = S(f)$$

$$C_{2,2U}(f) = S(f) \int_0^{2\pi} T_2^2(f, \vec{U}(\theta)) D(f, \theta) \frac{\cos^2 \theta}{\tanh^2 [k(f, \vec{U}(\theta))d]} d\theta$$

$$C_{3,3U}(f) = S(f) \int_0^{2\pi} T_3^2(f, \vec{U}(\theta)) D(f, \theta) \frac{\sin^2 \theta}{\tanh^2 [k(f, \vec{U}(\theta))d]} d\theta$$

$$Q_{1,2U}(f) = S(f) \int_0^{2\pi} T_1(f, \vec{U}(\theta)) T_2(f, \vec{U}(\theta)) D(f, \theta) \frac{\cos \theta}{\tanh [k(f, \vec{U}(\theta))d]} d\theta$$

$$Q_{1,3U}(f) = S(f) \int_0^{2\pi} T_1(f, \vec{U}(\theta)) T_3(f, \vec{U}(\theta)) D(f, \theta) \frac{\sin \theta}{\tanh [k(f, \vec{U}(\theta))d]} d\theta$$

$$C_{2,3U}(f) = S(f) \int_0^{2\pi} T_2(f, \vec{U}(\theta)) T_3(f, \vec{U}(\theta)) D(f, \theta) \frac{\sin \theta \cos \theta}{\tanh^2 [k(f, \vec{U}(\theta))d]} d\theta$$

Validate developed
method

Experimental tests
Full-scale data

