Overview

Investigators

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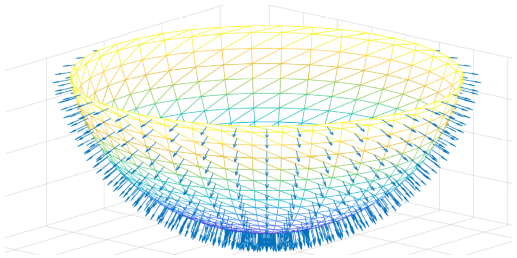
CoI: Dr Ajit Pillai
CoI: Dr Tom Davey

Objectives

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

1. Obtain Buoy Transfer Functions in Current

Account for modified dispersion relation and mooring dynamics



2. Develop new buoy analysis approach to account for current

Include modified transfer functions & **estimate** current

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

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

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

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

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

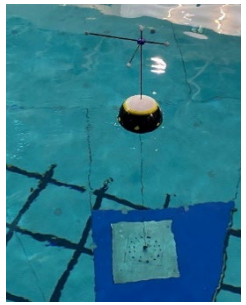
$$C_{2,3U}(f) = S(f)\int_0^{2\pi} T_2(f,\vec{U}(\theta))T_3(f,\vec{U}(\theta))D(f,\theta)\frac{\sin\theta\cos\theta}{\tanh^2[k(f,\vec{U}(\theta))d]}d\theta$$

3. Validate developed method

Experimental tests
Full-scale data

1. Obtain Buoy Transfer Functions in Current





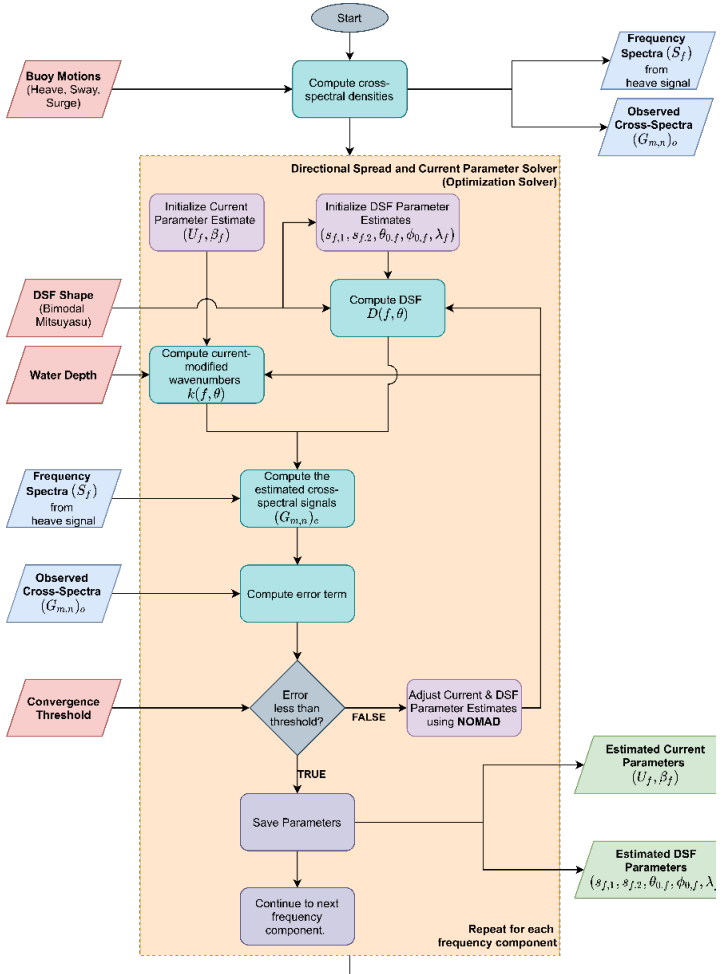
- Draycott, S., Pillai, A.C., Gabl, R. and Davey, T., 2021. **Wave buoys in current - experimental results and observations**, EWTEC 2021
- Gabl, R., Draycott, S., Pillai, A.C. and Davey, T., 2021. **Experimental Data of Bottom Pressure and Free Surface Elevation including Wave and Current Interactions**. *Data*, *6*(10), p.103.
- Draycott, S., Pillai, A.C., Gabl, R. Stansby, P. K. and Davey, T**, *An experimental assessment of the effect of current on wave buoy measurements*.** *Under review.*

Buoy data

Empty tank data

2. Develop new buoy analysis approach to account for current

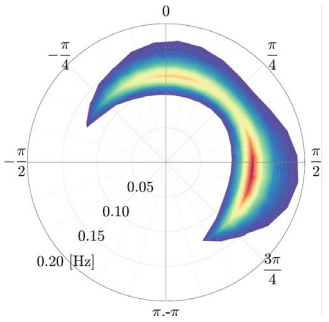
- Pillai, A.C., Davey, T. and Draycott, S., 2021**. A framework for processing wave buoy measurements in the presence of current.** Applied Ocean Research, 106, p.102420.



3. Validate developed method

- **In progress…**
- Method validated using simulated datasets
- Currently working on validation from experimental tests
- Plan to validate on full-scale data

Target



Estimated