PHASE-RESOLVED WAVE PREDICTION AND SURFACE RECONSTRUCTION FROM SWIFT BUOY ARRAY

MICHAEL SCHWENDEMAN

1. Introduction

- Project motivated by problem of wave energy conversion. Much more efficient with advanced controls. Most ideal: exact knowledge of the incident wave field. Current practice: tune devices using only the long-time average wave statistics.
- Our question becomes: can we provide a better prediction of the incoming wave energy to a WEC then simply using the 30-minute average bulk wave parameters by making use of an array of buoys situated in front of the WEC?
- As a side question, which may be of more widespread applicability, can we construct an approximate sea surface reconstruction from the sparse buoy array?

- This report documents the progress made so far on these questions. It is broken into three sections:
1) Integration of SBG Ellipse into version 4 SWIFT buoys, and program for receiving data in real-time over RF ethernet bridge using python.
2) Development of phase-resolved algorithm using linear simulations from buoy directional spectra.
3) Evaluation of phase-resolving algorithm using real data obtained from a research cruise off of Southern California associated with the langmuir circulation DRI.
Finally, it closes with several recommendations and ideas for future work and directions.

2. SBG and Ethernet Bridge Integration

3. Linear Simulations and Least Squares Prediction Algorithm

4. Evaluation from SWIFT data

5. Recommendations for Future Work

Date: 30 April, 2017.