

## **Benchmark Test # 5**

### **Solitary wave runup on a shelf with a conical island**

#### **1. Model setup**

The bathymetry grid was generated using the bathymetry data recorded in 'TWB 071708\_5CM\_XYZ\_METERS.txt'. The grid sizes for the data are

$dx\_data = 0.04379$  m

$dy\_data = 0.02658$  m

Two sets of model grid sizes were used in the simulations. One is called the fine grid which doubled data grid sizes, that is (0.0876, 0.1063). The other is called the coarse grid, which quadrupled the data grid sizes, that is (0.1752, 0.2126).

The bathymetry data was shifted downward to get 0.78m at the left edge of the basin.

In order to initialize the solitary wave on the left side, the model domain was extended to the left by 17.7 m (101 points in the fine grid). The model dimensions are 600x250 and 300x125, respectively, for the fine grid and coarse grid.

We performed three runs:

- 1) The fine grid run with the artificial eddy viscosity breaking scheme.
- 2) The coarse grid run with the artificial eddy viscosity breaking scheme.
- 3) The fine grid run with SWE switch scheme.

The bottom friction coefficient is 0.001 in all cases.

#### **2. Model results**

- 1) The fine grid versus the coarse grid

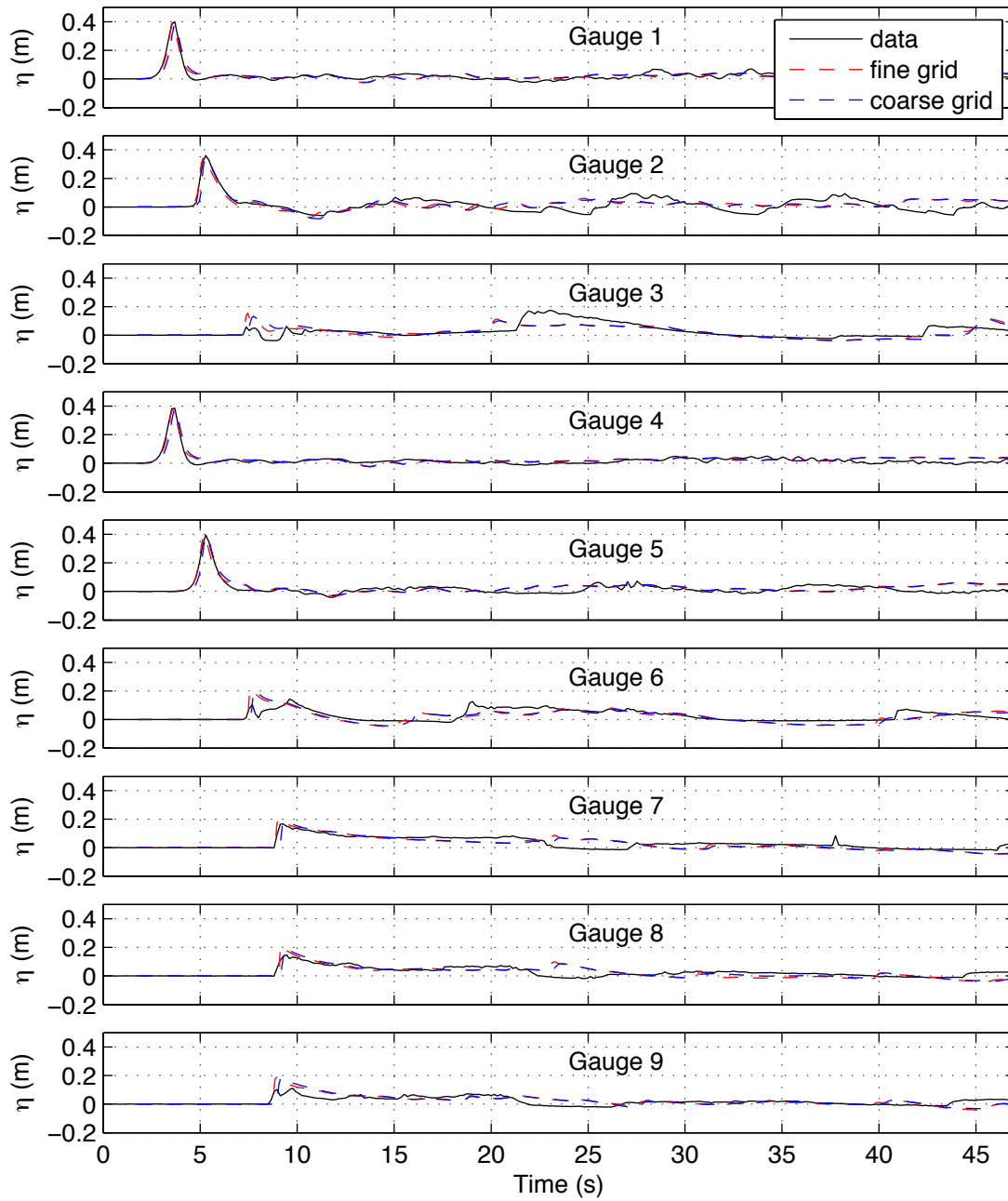


Figure: Comparison of surface elevation between the fine grid model, coarse grid model and data.

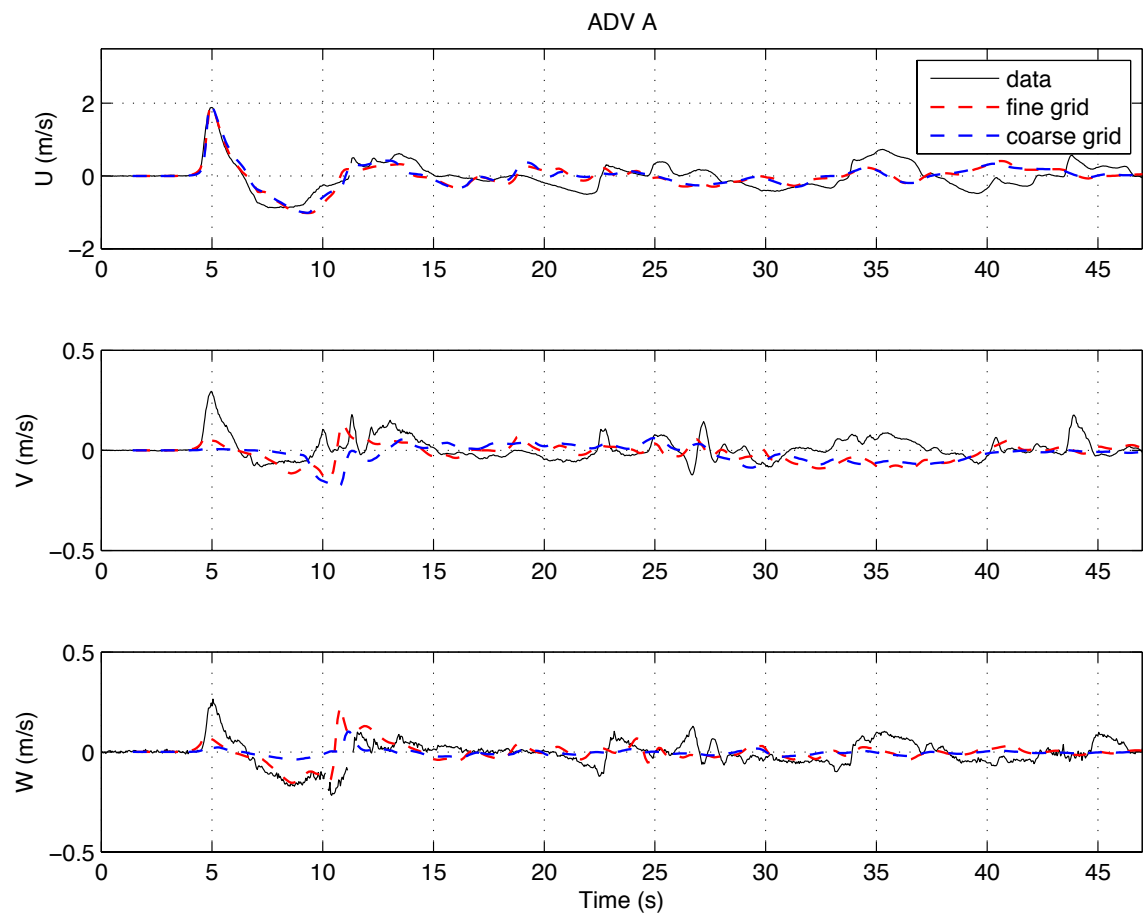


Figure: Comparison of (U,V,W) at ADV A. Note: the measured W are flipped over (i.e.,  $W=-W$ )

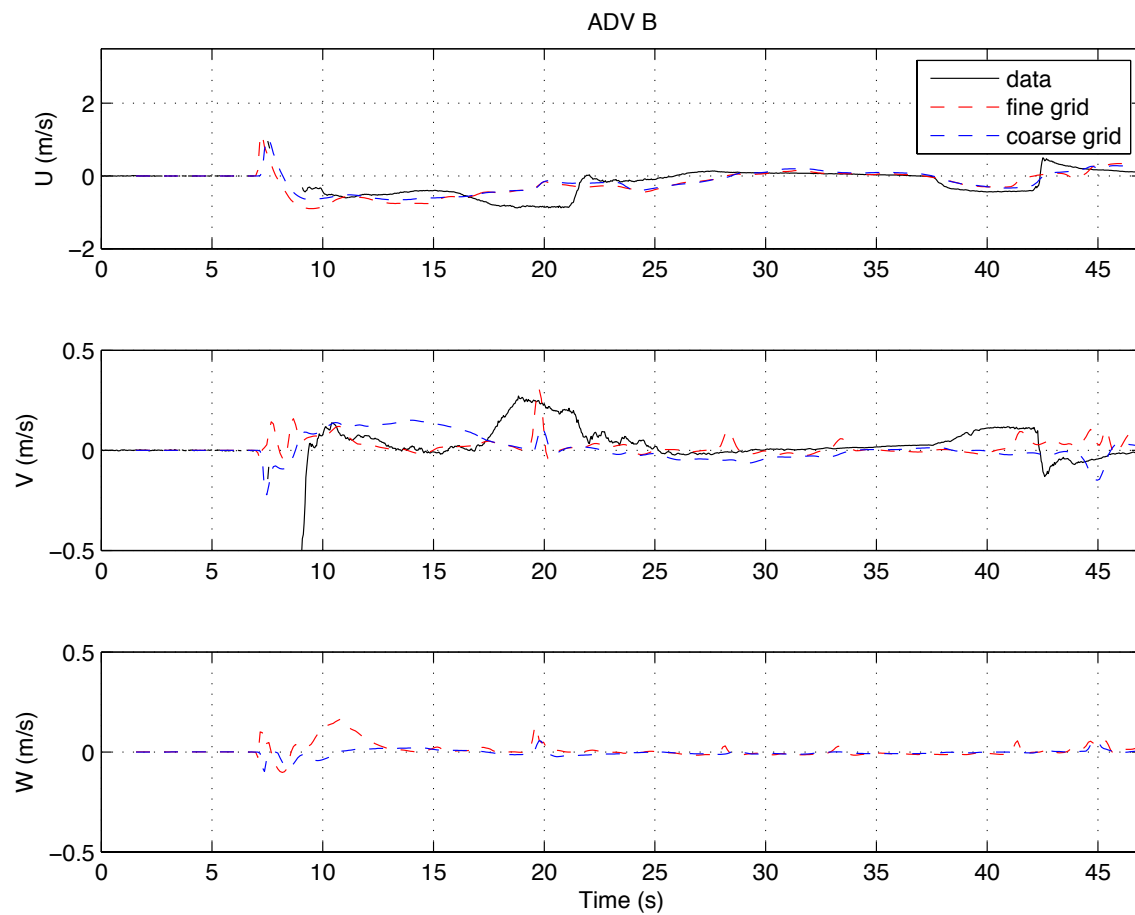


Figure: Comparison of (U,V,W) at ADV B. Note: the measured W is NAN.

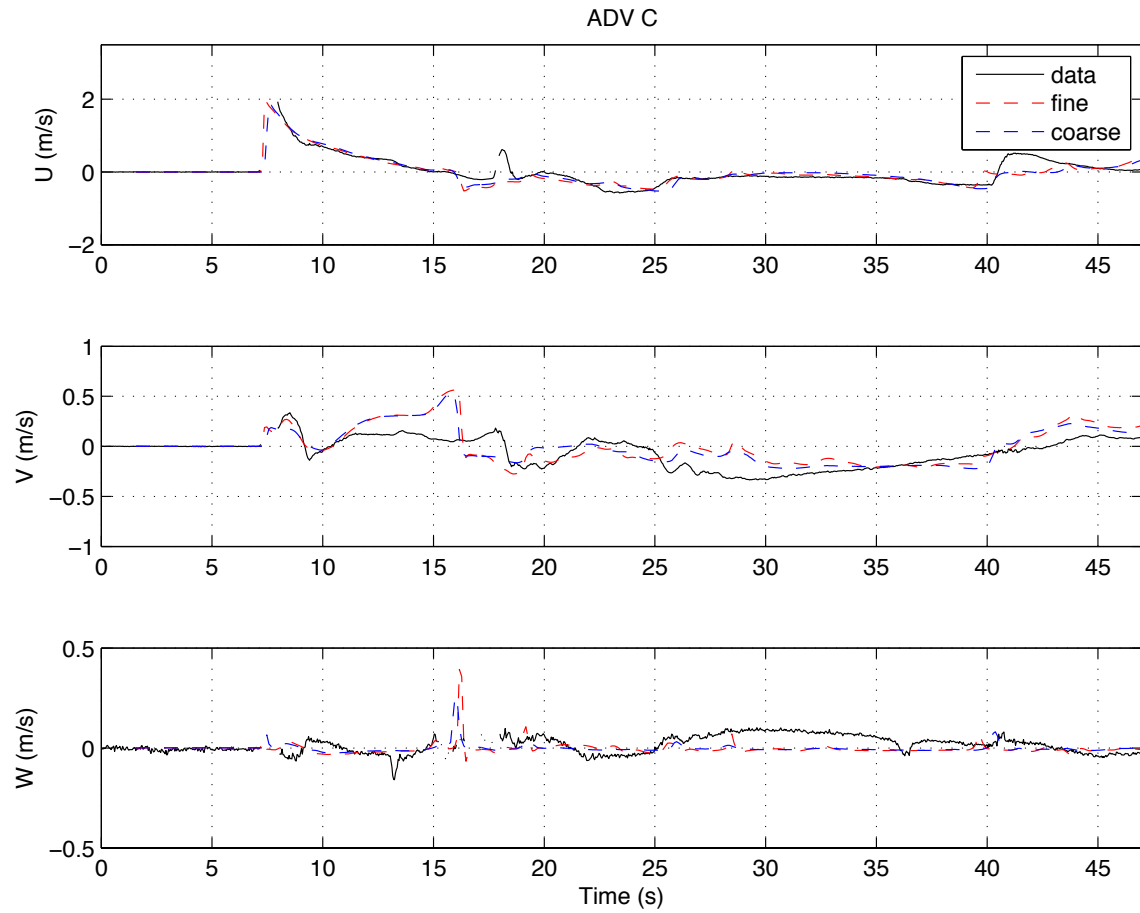


Figure: Comparison of (U,V,W) at ADV C. Note: the measured W are NOT flipped over.

- 2) The artificial eddy viscosity scheme versus SWE switch breaking scheme (the fine grid)

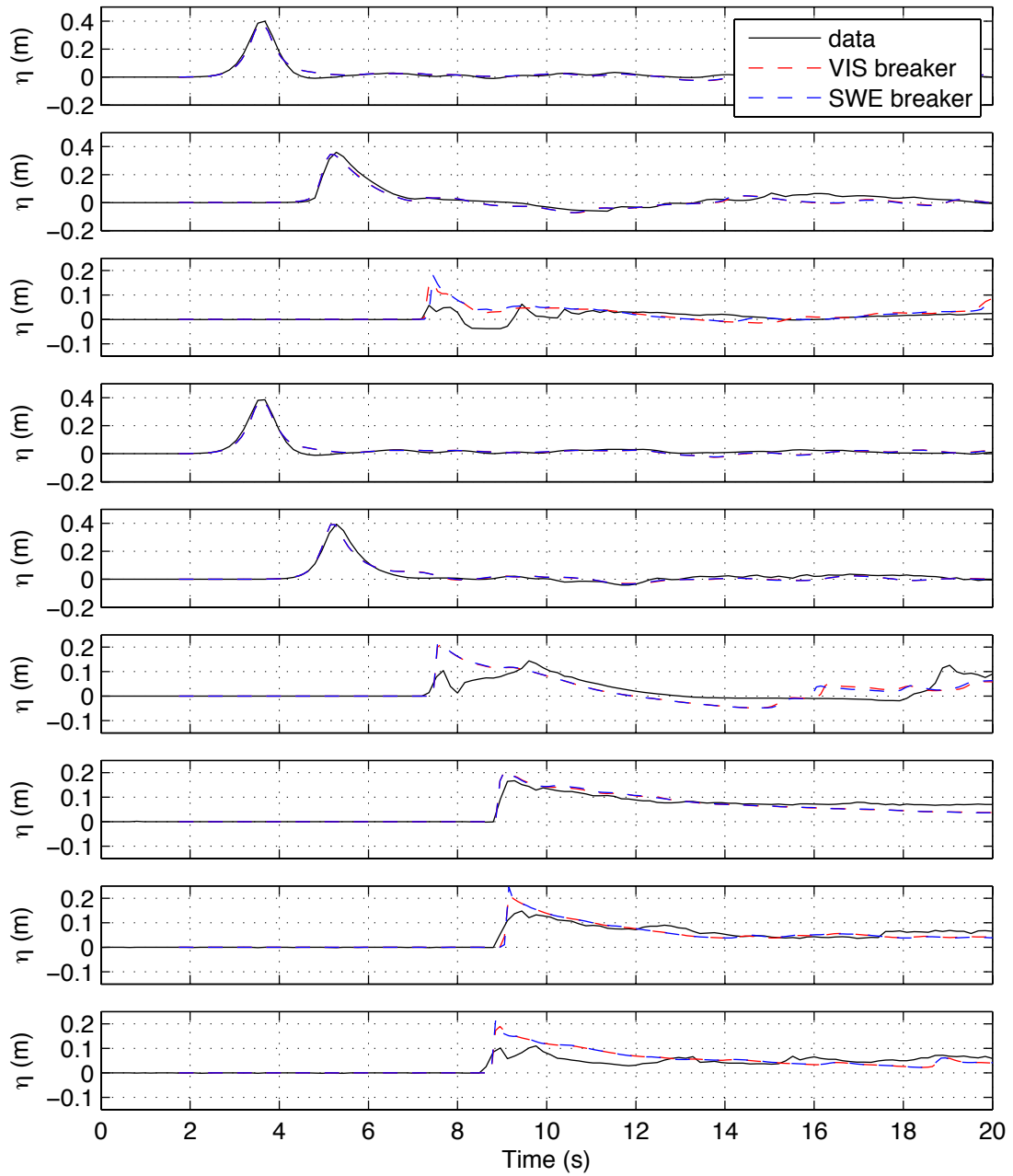


Figure: Comparison of surface elevation between VIS breaker model, SWE breaker model and the data. WG1-WG9 from top to bottom.

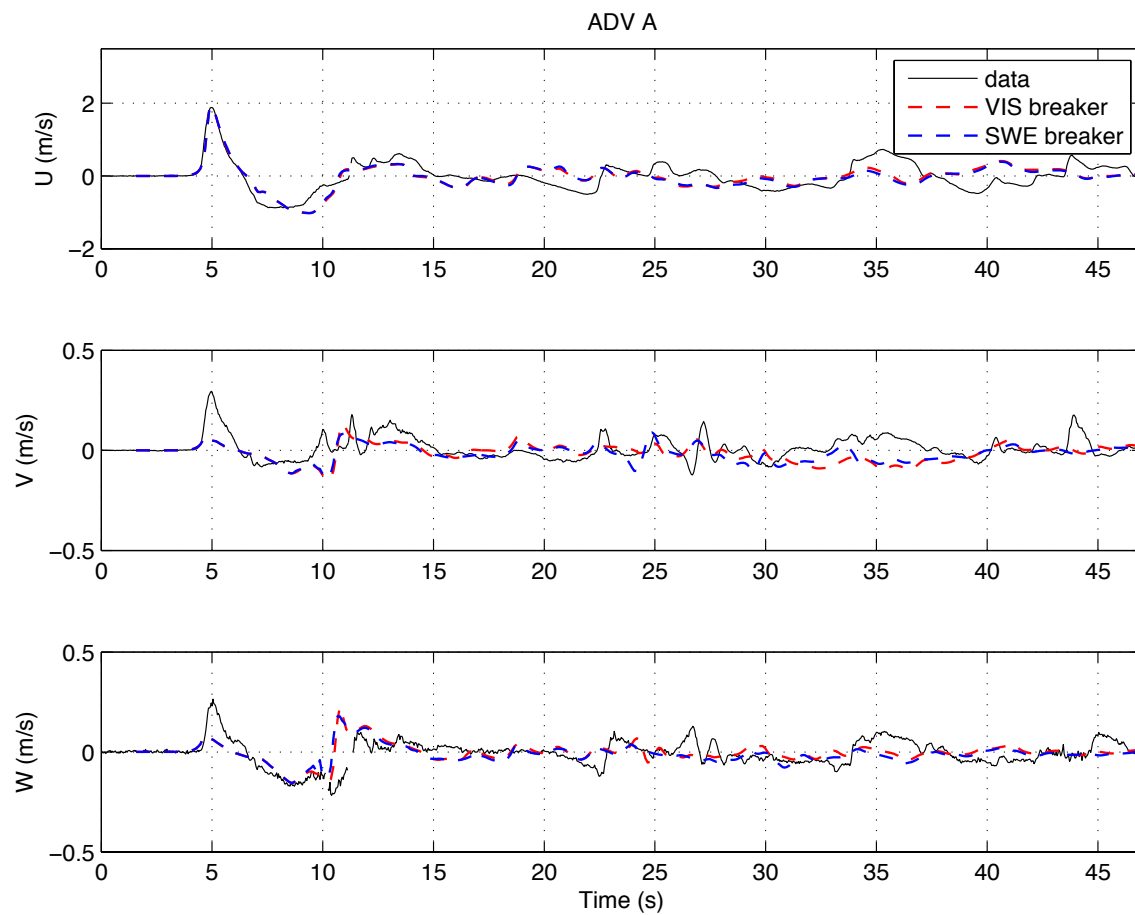


Figure: Comparison of (U,V,W) at ADV A. Note: the measured W are flipped over (i.e.,  $W = -W$ ).

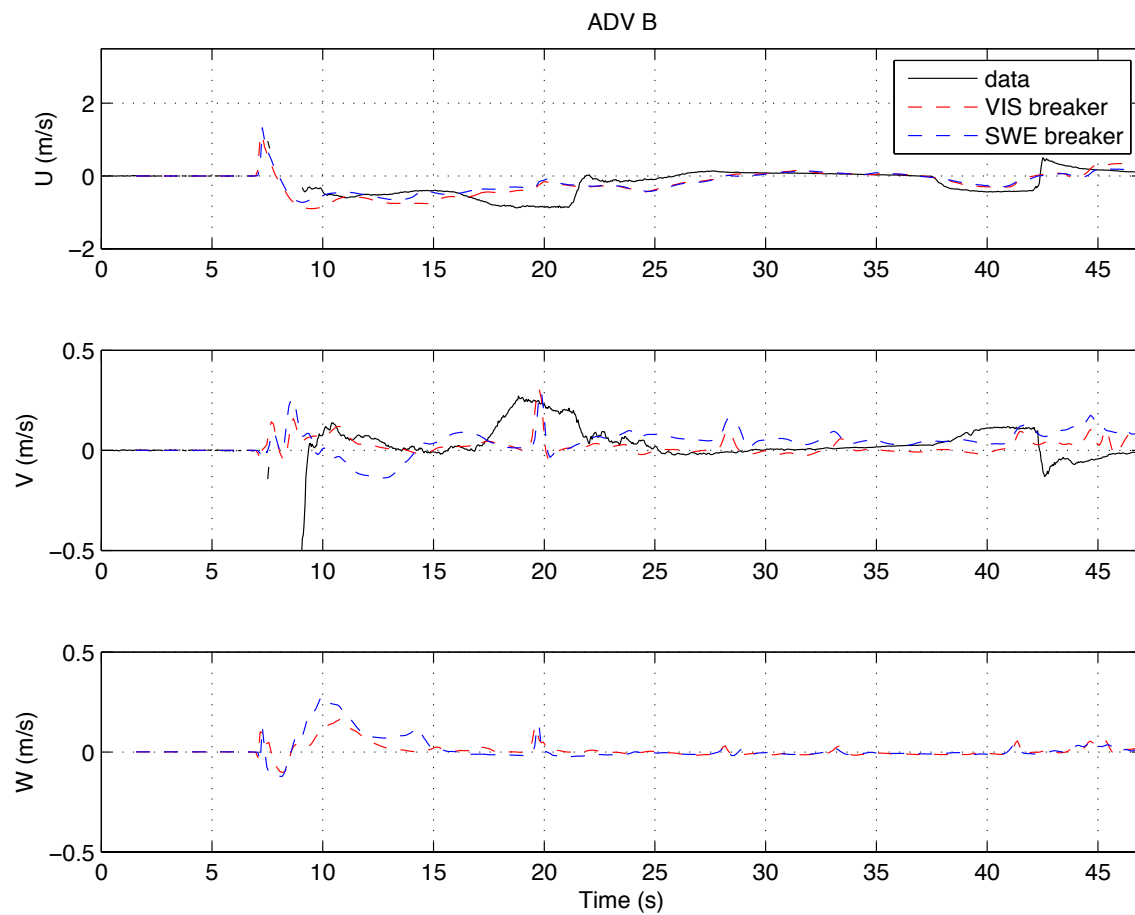


Figure: Comparison of (U,V,W) at ADV B. Note: the measured W is NAN.



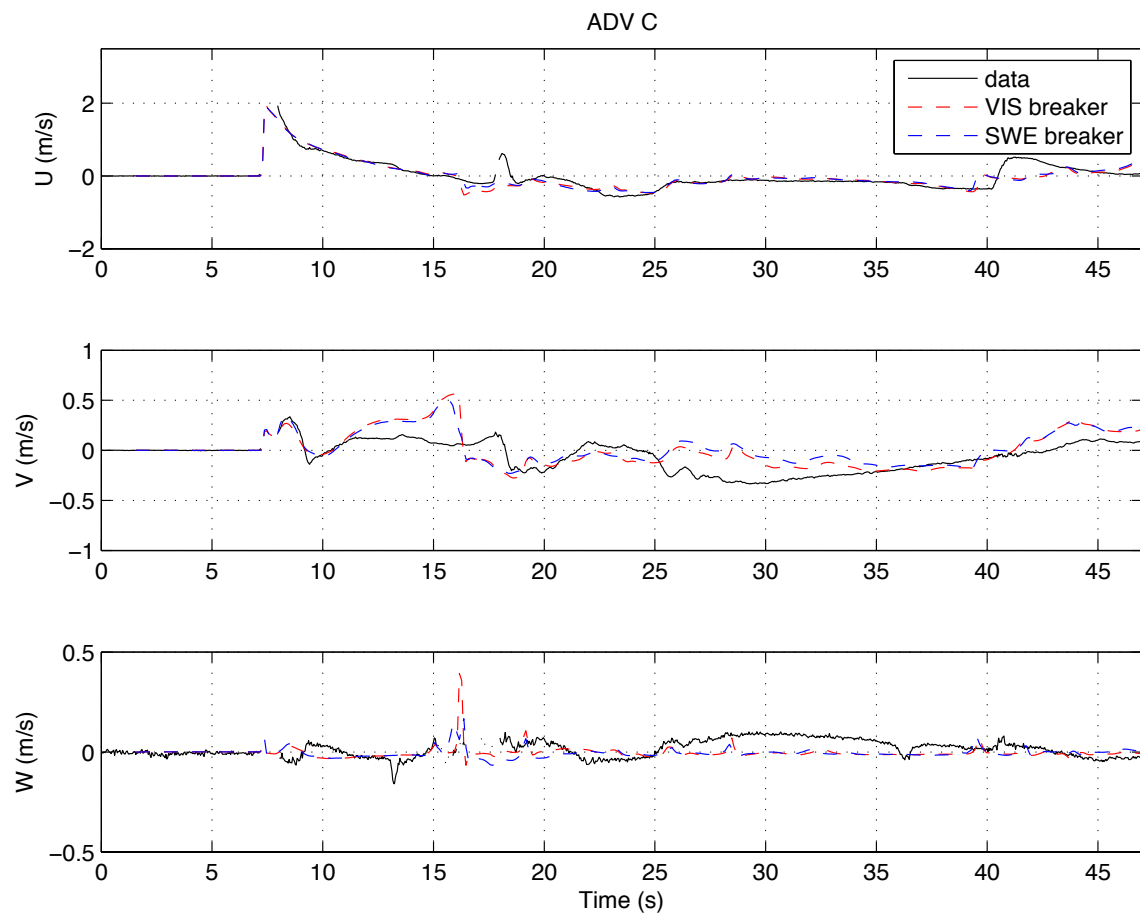


Figure: Comparison of (U,V,W) at ADV C. Note: the measured W are NOT flipped over.

### 3. About measured W