

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

High-resolution reconstruction and prediction of irregular wave field using adjoint-based data assimilation JIE WU, XUANTING HAO, LIAN SHEN, Univeristy of Minnesota, Twin Cities; St. Anthony Falls Laboratory — Wave surface elevation and/or velocity data observed from measurements such as marine radar and wave buoys are inevitably of limited resolution in time and space. In order to overcome this limitation, we developed an adjoint-based data assimilation intended for wave reconstruction and prediction with high precision. In this model, we define a cost function for the error between computed surface elevation and measurement, where the initial surface elevation and surface pressure are treated as control variables. The cost function, namely the error, is reduced in an optimization process with the gradient information provided by the adjoint equations. The result is satisfactory when a highly nonlinear irregular wave field is reconstructed from marine radar data, and the reconstructed wave field recovers the kinematic and dynamic details missing from the original measured data.

JIE WU
Univeristy of Minnesota, Twin Cities; St. Anthony Falls Laboratory

Date submitted: 31 Jul 2017

Electronic form version 1.4