Geophysical Research Abstracts
Vol. 18, EGU2016-5195, 2016
EGU General Assembly 2016
© Author(s) 2016. CC Attribution 3.0 License.

Acoustic Remote Sensing of Rogue Waves

Wade Parsons (1) and Usama Kadri (2,3)

(1) Faculty of Engineering and Applied Science, Memorial University of Newfoundland,Canada (wade.parsonsnl@gmail.com), (2) Department of Mathematics, Massachusetts Institute of Technology, Cambridge,USA (ukadri@mit.edu), (3) The Hatter Department of Marine Technologies, University of Haifa, Haifa, Israel

We propose an early warning system for approaching rogue waves using the remote sensing of acoustic-gravity waves (AGWs) – progressive sound waves that propagate at the speed of sound in the ocean. It is believed that AGWs are generated during the formation of rogue waves, carrying information on the rogue waves at near the speed of sound, i.e. much faster than the rogue wave. The capability of identifying those special sound waves would enable detecting rogue waves most efficiently. A lot of promising work has been reported on AGWs in the last few years, part of which in the context of remote sensing as an early detection of tsunami. However, to our knowledge none of the work addresses the problem of rogue waves directly. Although there remains some uncertainty as to the proper definition of a rogue wave, there is little doubt that they exist and no one can dispute the potential destructive power of rogue waves. An early warning system for such extreme waves would become a demanding safety technology.

A closed form expression was developed for the pressure induced by an impulsive source at the free surface (the Green's function) from which the solution for more general sources can be developed. In particular, we used the model of the Draupner Wave of January 1^{st}, 1995 as a source and calculated the induced AGW signature. In particular we studied the AGW signature associated with a special feature of this wave, and characteristic of rogue waves, of the absence of any local set-down beneath the main crest and the presence of a large local set-up.