FPS-T-17-0290

02 July 2018

X9ANXCAS

To: Andy Newman

From: B. W. Frazier

Subject: Modeling the Ocean Surface for RF Propagation in Maritime Multi-static Engagements

Attachment: Ocean Surface Modeling Memorandum

References: See Attachment

1. Multistatic engagements over the ocean complicate traditional RADAR system analysis. Because the receivers and transmitters are not co-located, we cannot leverage reciprocity and must treat each path separately. The statistics of ocean waves in the propagation direction are dependent on the angle relative to the wind, so each path will propagate over a surface with different statistics. Traditional ocean wave power spectral models such as Pierson-Moskowitz are purely one-dimensional and do not provide the ability to change the spectrum with wind direction.
2. The attached memo outlines how to model ocean surfaces through the Elfouhaily spectrum in both 1 and 2 dimensions and for both stationary and time-varying cases. This spectrum is compared to traditional models and a discussion is provided on sampling constraints and symmetry restrictions for generating the random surfaces. Finally, example Matlab code to generate these surfaces is provided.

Internal Distribution:

D. K. White

E. Q. Rose

G. E. Mitzel

C. J. Maranzano

C. M. Boswell

Group/Branch Files

FPS Archive