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02 July 2018

X9ANXCAS

To: Andy Newman

From: B. W. Frazier

Subject: Analytical Electromagnetic Propagation Models

Attachment: Green’s Functions in Electromagnetic Propagation Memorandum

References: See Attachment

1. Electromagnetic propagation in maritime environments is a very well-studied field. Unfortunately, there are many short cuts taken during discussion of numerical implementations that lead to errors in notation for analytical results. In addition, references tend to only look at part of the problem and have different conventions for normalization and definition of propagation direction. This in turn
2. The attached memo outlines the derivation of diffraction integrals for Electromagnetic propagation problems using Green’s functions. It starts by presenting Green’s identities and method to ensure consistency and then derives the canonical free space Green’s functions in both the time and frequency domains before working through diffraction integrals.

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