

## BIOGRAPHICAL SKETCH

Corey D. Cooke is currently employed at Applied Technology, Inc., King George, VA. His research interests include waveform design, signal analysis, stochastic signal modeling, and radar system modeling and simulation.

## EDUCATION

Tennessee Technological University  
Cookeville, TN USA  
BS, Electrical Engineering, 2009

Virginia Polytechnic Institute & State University  
Blacksburg, Virginia, USA  
MS, Electrical Engineering, 2011

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## College of Engineering

TENNESSEE TECH

The Department of  
Electrical & Computer Engineering  
Announces the Dissertation Defense  
Of

*Corey D. Cooke*

In Partial Fulfillment of the Requirements  
For the degree of  
Doctorate of Philosophy

October 29, 2019

Held in

208 Brown Hall at 3:30 p.m.

115 West 10<sup>th</sup> Street

**Tennessee Tech University**

**FIELD OF STUDY**  
**Signal Processing**

**DISSERTATION TOPIC**  
**“ Random Linear Time-Varying System  
Theory for Sea Clutter Modeling”**

**EXAMINING COMMITTEE**

Dr. Adam L. Anderson, Committee Chair  
Joint Faculty with the Oak Ridge National Laboratory

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**Abstract**

In this dissertation, we advocate for the use of Bello's random linear time-varying (RLTV) system theory for modeling radar sea clutter. RLTV system theory provides additional rigor to clutter modeling problems, unifies disparate modeling approaches, and expresses clutter models in a mathematical framework that is used by other disciplines. This creates opportunities for developments from other branches of the signal processing field to be more easily translated to clutter modeling and clutter filtering problems.

Analytic derivations of the second-order statistics are performed in such a way that data from existing clutter models can be integrated relatively easily. Applications of the theory to target detection problems are highlighted, and a set of spectral analysis tools based on RLTV system theory are used to characterize the coherence and stationarity properties of clutter observations. Empirical validation of the core assumptions of the RLTV clutter model is performed against the Australian Ingara clutter dataset.