Date: October 12th

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: Dr. Tihomir Hristov

Johns Hopkins University

Title: *"Surface waves and wave-driven fields over the ocean: Implications for atmospheric electromagnetics and ocean acoustics"*

Abstract

The transmission of a signal through a media is substantially affected by the dynamics and the statistics of the media's motion. Numerical models describing the propagation of radar signals over the ocean have exhibited a reproducible tendency to overestimate the the signal's intensity at the receiver, a fact with far-going practical consequences. The situation suggests that the physical mechanisms responsible for signal degradation are not fully understood and accounted for. To address the problem, this work reviews the two main physical factors influencing the signal, i.e. the scattering by the rough ocean surface as well as the dynamics and the refractive structure of the marine atmospheric boundary layer. Our analysis determined that a widely adopted scattering model is inconsistent with theoretical works that precede it as well as with observational data. Due to such inconsistency, the model overestimates the scattered signal's intensity and thus is responsible, entirely or partially, for the discrepancy in intensity between measurements and propagation model predictions. Here we propose an alternative description of scattering, free of that model's deficiencies. We also present instances, not reported earlier, where the surface wave modulation of the whole atmospheric boundary layer is clearly observable, as illustrated by the fields of wind velocity and atmospheric refractivity. We propose an explanation for this process and quantify the effect of that modulation on the signal's propagation pattern.