UNIVERSITY OF CALGARY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Antenna Phase Center Consideration, Effects and Measurements in GNSS Ranging Application

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The last decade has seen explosive growth of applications involved precise positioning applications. Global Positioning System (GPS) is the most widely known and used system for such applications. There are new systems being developed by other countries that mirror GPS performance such as Galileo, Glonass and Compass (referred to as GNSS system). Continuous improvement in signal processing algorithms directly translates to improved positioning accuracy (to mm and sub-mm range). The electrical position of the antenna suddenly plays a crucial role in the overall system accuracy. The new challenge is to design antenna that have common electrical position across wide bandwidth (up to 25% in case of GNSS).

The electrical position of the antenna is commonly referred to as "Phase Center". Phase Center has been generally ignored in the past, since it is not an important parameter for communication systems. Therefore, it is not a surprise that there is not much publication on this subject in the engineering and scientific literature.

The purpose of this presentation is to demonstrate different methods of measuring and calculating (post-processing measured data) the phase center location and its movement with azimuth and elevation angle. The effect of polarization mismatch, multipath effects on phase center movement will also be demonstrated. Various antenna examples will be presented.

Waldemar Kunysz obtained a BSEE from the Technical University of Nova Scotia in 1989. From 1991 to 1995 he worked on phased array antennas for Microwave Landing Systems with Micronav Inc. From 1995 to the present he has been with NovAtel Inc. He has published several technical papers and proceedings articles for various conferences. His current research interests include antenna theory and design, multipath mitigation techniques, ultra-wideband (UWB) technology, genetic algorithms and electromagnetic compatibility.

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