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Speaker: Dr. Inder “Jiti” Gupta, Ohio State University
Topic: GNSS Adaptive Antennas



Abstract

Many military GNSS (Global Navigation Satellite Systems) receivers use adaptive antennas for electronic protection. The performance of these antennas strongly depends on the type and distribution of individual antenna elements as well as on the method used to find the weights of various antenna elements in real time. This presentation will begin with the description of some commonly used adaptive methods for antenna weight update. Next, we will discuss the performance of these adaptive methods in the presence of interfering signals. The performance metric will include the output signal-to-noise ratio (SNR) as well as carrier phase and code phase biases introduced by the adaptive antenna. As expected, we will show that the presence of interfering signals can degrade the output SNR as well as can alter the code and carrier phase biases. For precise navigation systems, one should be aware of these degradations, and either should include these degradations in the error budget or should develop methods to compensate/mitigate the antenna induced biases. A novel method for mitigating the antenna induced biases in GNSS receivers will also be described.

Biography

Dr. Inder J. Gupta is a Senior Research Scientist with the department of Electrical and Computer Engineering of the Ohio State University. He is a Fellow of IEEE and Institute of Navigation. He is also an Edmond S. Gillespie Fellow of Antenna Measurement Techniques Association (AMTA). He received AMTA Distinguish Achievement Award for 2007. He is also the recipient of IEEE Antennas and Propagation Society’s H.A. Wheeler Applications Prize Paper Award for 1991, and the Ohio State University College of Engineering Lumley Research Award for 1991, 1998 and 2005. During last ten years he has worked extensively on GPS antennas and antenna electronics, and their effects on GPS receiver performance. He developed the first analytical model to estimate the performance of SFAP-based GPS adaptive antennas. In 2002, he designed and built a new ground plane for the testing of actual GPS production antennas. He has studied the effects of platform generated multipath on GPS AJ antennas, and the effects of individual antenna element bandwidth and element distribution on the performance of GPS adaptive antennas. He has also worked on reduced size GPS adaptive antennas with wide bandwidths to cover all satellite navigation frequency bands. Most recently, his research team developed the first adaptive antenna algorithm that simultaneously optimize C/N and guarantee no antenna induced carrier and code phase biases in GNSS measurements. This achievement is a key development for Navy’s Joint Precision and Approach Landing System (JPLAS).