

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advanced Technologies for Space Communications and Navigation (4)

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UWB TECHNOLOGY APPLICATION FOR COMMUNICATIONS OF SPACECRAFT

Abstract

ultra wide bandwidth(uwb) technology is a wireless transmitting pulse without carrier technology that has surpassing capability of high transmitting rate and accurate range measurement at the same time. uwb technology is getting more attention and is competent for spacecraft communications. This paper describes the conception and characteristics of uwb that suitable for communications between satellite and ground station, and for that in inter satellite link. part1, the constrains of uwb emission power spectral density(psd) is specified by federal communications commission(fcc). to utilize effectively the emission power and meet the limiting psd, the secondary differential gauss pulse is employed. in the expression of the pulse, forming component varies to adjust pulse shape and to make emission psd meeting the specification. effective communication is complete using uwb technology and depresses uwb interference as well. part2, uwb realizes signal modulation according to phase-modulation, amplitude-modulation, on/off modulation, direction-modulation, and position-modulation, emitting pulse without carrier. in this part an algorithm of uwb ranging measurement is shown also. part3, taking geo satellite for an instance, using uwb technology, communications feasibility of satellite with ground station and of inter satellite link is verified. here as an example, a satellite with 1m diameter omni antenna communicates with ground station in ku band, and communicates with another satellite in ka band. the links data shows that uwb technology can realize signal transmitting of satellite and ground station, and of inter satellite link, and can meet the constrain of emission psd.