

Lunar Exploration (3)
Lunar Analysis & Simulation (4)

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SIMULATION OF LUNAR COMMUNICATION ENVIRONMENT AND RESEARCH & ANALYZING
OF CHANNEL ON LUNAR EXPLORATION PROJECT

Abstract

Information transfer between moon-earth detecting equipment astronaut and mooncraft mainly depends on wireless communication system, while the performance of wireless communication system lies on fading character of wireless channel. Therefore if we want to transfer useful information with high quality and capability within limited frequency resource as possible as we can, we have to understand channel character very well. The main function of wireless radio wave spread loss prediction is to construct all kinds of spread prediction model based on theory analyzing or statistic analyzing of practice testing data or the combination of the two above. Predicting spread path loss with parameters of given frequency distance antenna height of receiving and emission beacon and environment parameter. Moon as a satellite of earth has its special geographical environment: 1) radius only 0.27 of earth, bigger moon curvature, moon has its limit of radio wave's linear spread distance; 2) As there is no cover of atmosphere, radio wave won't curve when spreading due to refraction of atmosphere. So, we need't to consider equivalent gain of moon radius; 3) As antenna with transmitting and receiving end lies on a low position, meanwhile landing area may exist object such as rock, reflection of radio wave between moon and earth exists; 4) moon has great wave landform such as ring mountain valley, meanwhile it also has relatively flatness landform such as moon ocean moon land. All the special environment factors above will have important impact on communication. Firstly, based on the second period of china's lunar exploration project, as application background of wireless communication on lunar surface, Reference on advice according to communication environment and channel analyzing and calculating provided by CCSDS, this paper research and construct fading model of radio wave on lunar surface, it simulates radio frequency communication environment and spreading character of electromagnetic wave on lunar surface, it provides reference to solve fading effect on lunar surface. In process of research, we construct and introduce spreading fading model of radio wave on lunar surface, analyzing path loss of radio wave spreading; meanwhile we analyze effect of multi-path interference on performance of wireless communication system, then we give the outcome of communication quality on lunar surface in the condition of changing of parameters including transmission distance lunar environment. All the above give strong support for design of future communication link on lunar surface.