## SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2) Near-Earth and Interplanetary Communications (2)

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## ANALYSIS OF DISTRIBUTED ANTENNA ARRAY COMBINING ALGORITHM PERFORMANCE FOR WEAK SIGNAL OF DEEP SPACE COMMUNICATIONS

## Abstract

Antenna arraying is an important method to receive weak signal of deep space communications. Existing antennas in different areas can be used to construct a distributed antenna array, and the cost will be reduced significantly. Signal combining algorithm is a key technologies of distributed antenna array, including reception bound analysis, signal feature analysis and estimation, theory of correlative combining. For single array antenna, received deep space signal SNR is very low, so accumulation manipulation must be applied in signal combining algorithm to find a set of optimal weight. Based on deep space arraying signal combining scheme, two signal combining algorithm, Eigen and Sumple algorithm is analyzed. Firstly, deep space arrays signal combining scheme will be studied and general theoretical framework for optimal signal combining using the Eigen algorithm will be analyzed, a fast Eigen-based signal combining algorithms C-PMFM will be proposed. Based on single step iteration Eigen algorithm, relationship of Eigen and Sumple algorithm will be discussed. Finally, numerical simulations of given algorithms will be presented in detail. Simulations indicate that Sumple algorithm got higher convergence speed in condition of long integrated time and C-PMFM 5 step iteration although needs more amount of computing operations and memory storagebut can get higher combining performance than Sumple algorithm in lower SNR condition.