

SWIPT in Rician MIMO Interference Channels with Spatial Antenna Correlation

Abstract

In this paper, we investigate simultaneous wireless information and power transfer (SWIPT) under spatial correlation in multiuser multiple-input-multiple-output (MU-MIMO) fading channels where the line-of-sight (LOS) path between the transmitter and the receiver is present. While the energy receiving terminals are harvesting energy, the information receiving terminals are receiving their desired signal-to-interference-plus-noise ratio (SINR) under the total power constraint at the transmitting terminal of the proposed SWIPT system. We use the Kronecker model to study the impact of MIMO antenna correlation and the Rician K-factor as the main parameter to set up the different fading conditions. We use semi-definite programming (SDP) to formulate the proposed SWIPT system. Our numerical results confirm that the performance of the proposed design improves in the absence of LOS component, i.e., with a zero K-factor or pure Rayleigh fading channel, and deteriorates as the LOS channel component grows. We show that the total harvested energy monotonically decreases as the Rician K-factor increases.

Keywords

Energy harvesting; MU-MIMO; Rayleigh fading; Rician fading; SWIPT