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“A Universal Encoding Scheme for MIMO Transmission Using a Single Active Element for PSK Modulation”

Abstract

A universal scheme for encoding multiple symbol streams using a single driven element (and consequently a single radio frequency (RF) frontend) surrounded by parasitic elements (PE) loaded with variable reactive loads, is presented. The proposed scheme is based on creating a MIMO system by expanding the far-field of a compact parasitic array into an orthogonal set of angular functions (basis). Independent information streams are encoded by means of angular variations of the far-field in the wavevector domain, rather than spatial variations as usually happens in conventional MIMO systems.

The array can spatially multiplex the input streams by creating all the desired linear combinations (for a given modulation scheme) of the basis functions. The desired combinations are obtained by projecting the ratio of the symbols to be spatially multiplexed on the ratio of the basis functions’ weights (complex coefficients), which is a function of the currents induced on the PE within the antenna domain, and controlled by the independent reactive loadings.