【CLAIMS】

【Claim 1】

A method for transmitting a codebook-based Physical Uplink Shared Channel (PUSCH) performed by a User Equipment (UE) in a wireless communication, comprising:

receiving restriction information of precoding matrix usable in the PUSCH transmission in the codebook;

receiving, from the network node, downlink control information, DCI, for uplink, UL, transmission; and

performing codebook based PUSCH transmission based on precoding information included in the DCI and the restriction information,

when the PUSCH is transmitted using four antenna ports, the codebook includes:

a first group including non-coherent precoding matrixes for selecting only one port for each layer,

a second group including partial-coherent precoding matrixes for selection two ports in at least one layer, and

a third group including full-coherence precoding matrixes for selection all ports for each of the layers.

【Claim 2】

The method of claim 1,

wherein the non-coherent precoding matrix is a matrix including one vector having non-zero value in each column,

wherein the partial-coherent precoding matrix is a matrix including two vectors having non-zero value in at least one column, and

wherein the full-coherence precoding matrix is a matrix including only vectors having non-zero value.

【Claim 3】

The method of claim 2, wherein the codebook is a codebook based on Cyclic Prefix Orthogonal Frequency Division Multiplexing (CP-OFDM) waveform.

【Claim 4】

The method of claim 2, wherein the DCI includes Transmit Precoding Matrix Indicator (TPMI) which is information of an index of precoding matrix selected for the PUSCH transmission as the precoding information.

【Claim 5】

The method of claim 4, wherein the TPMI is joint-encoded with Rank Indicator (RI) which is information of a layer used in the PUSCH transmission.

【Claim 6】

The method of claim 5,

wherein the TPMI is indicated for each Sounding Reference Signal (SRS) resource configured to the UE, and

wherein the RI is commonly indicated for the configured SRS resources

【Claim 7】

The method of claim 5, wherein the TPMI and the RI are commonly indicated for all SRS resources configured to the UE.

【Claim 8】

The method of claim 5, wherein the TPMI and the RI are indicated for each SRS resource configured to the UE.

【Claim 9】

The method of claim 5, wherein a size of predefined DMRS (Demodulation RS) field in the DCI to determine a DMRS port is determined differently according to the RI joint-encoded with the TPMI.

【Claim 10】

The method of claim 9, further comprising receiving restriction information of a number of layers usable in the PUSCH transmission.

【Claim 11】

The method of claim 10, wherein a size of a field in which TPMI and RI are joint-encoded is decided based on the restriction information of the number of layers.

【Claim 12】

The method of claim 1, wherein the restriction information of precoding matrix indicates the precoding matrix usable in the PUSCH transmission in the group unit or individual precoding matrix unit.

【Claim 13】

The method claim 5, wherein a size of a field in which TPMI and RI are joint-encoded is decided based on the restriction information of precoding matrix.

【Claim 14】

A User Equipment (UE) for transmitting a codebook-based Physical Uplink Shared Channel (PUSCH) in a wireless communication system, comprising:

a radio frequency (RF) unit for transmitting and receiving a radio signal; and

a processor for controlling the RF unit,

wherein the processor is configured to perform:

receive restriction information of precoding matrix usable in the PUSCH transmission in the codebook,

receive downlink control information (DCI) for uplink (UL) transmission scheduling; and

performing codebook based PUSCH transmission based on precoding information included in the DCI and the restriction information,

when the PUSCH is transmitted using four antenna ports, the codebook includes:

a first group including non-coherent precoding matrixes for selecting only one port for each layer,

a second group including partial-coherent precoding matrixes for selection two ports in at least one layer, and

a third group including full-coherence precoding matrixes for selection all ports for each of the layers.

【Claim 15】

The method for transmitting PUSCH of claim 1,

wherein the restriction information of the precoding matrix is information for each of the first group, the second group, and the third group.