CLAIMS

[Claim 1] A data processing method in optical communication, comprising:

obtaining a to-be-sent bit data stream;

performing forward error correction, FEC, encoding processing on the to-be-sent bit data stream, to obtain M first encoded data streams, wherein M is an integer greater than 1; and

performing first data processing on the M first encoded data streams, to obtain W first dual-polarization symbol data streams, wherein

W is an integer greater than 1; each of the W first dual-polarization symbol data streams is located in two orthogonal polarization directions; the first data processing comprises symbol mapping processing; in either of the two polarization directions, P consecutive symbols in the first dual-polarization symbol data stream are obtained by performing symbol mapping processing on $q \times P$ bits, and the $q \times P$ bits are from at least two of the M first encoded data streams, wherein P is an integer greater than 1, and q is a positive integer; and in either polarization direction, each symbol is obtained by performing symbol mapping processing on q bits.

[Claim 2] The method according to claim 1, wherein the method further comprises:

performing digital signal processing DSP framing on each of the W first dual-polarization symbol data streams, to obtain W second dual-polarization symbol data streams; and

sending the W second dual-polarization symbol data streams on W paths of optical signals, wherein the W second dual-polarization symbol data streams are respectively carried on the W paths of optical signals, wavelengths of the W paths of optical signals are all different; or sending the W second dual-polarization symbol data streams through W optical fibers respectively; or performing digital subcarrier multiplexing on W subcarriers, to obtain one signal stream, and sending the signal stream, wherein the W second dual-polarization symbol data streams are respectively carried on the W subcarriers respectively.

[Claim 3] The method according to claim 1 or 2, wherein P=M, the $q \times P$ bits are from the M first encoded data streams, and every q bits in the $q \times P$ bits are from one of the M first encoded data streams.

[Claim 4] The method according to claim 3, wherein in either polarization direction, q bits that

are mapped to one symbol through the symbol mapping processing are from a same first encoded data stream.

[Claim 5] The method according to claim 3 or 4, wherein M consecutive dual-polarization symbols in the first dual-polarization symbol data stream totally comprise $2 \times M$ symbols in the two polarization directions, the $2 \times M$ symbols are obtained by performing symbol mapping on $2 \times q \times M$ bits, and the $2 \times q \times M$ bits are from the M first encoded data streams; and two symbols totally comprised in each dual-polarization symbol in the two polarization directions are obtained by performing symbol mapping on $2 \times q$ bits that belong to a same first encoded data stream.

[Claim 6] The method according to any one of claims 1 to 5, wherein performing first data processing on the M first encoded data streams, to obtain the W first dual-polarization symbol data streams comprises:

merging the M first encoded data streams into a second encoded data stream;

performing distribution processing on the second encoded data stream, to obtain W third encoded data streams;

performing symbol mapping processing on each of the W third encoded data streams, to obtain W first symbol data streams; and

performing polarization distribution on each of the W first symbol data streams, to obtain the W first dual-polarization symbol data streams.

[Claim 7] The method according to claim 6, wherein every M consecutive bit sets in the second encoded data stream are from the M first encoded data streams, and each of the M bit sets comprises S_0 consecutive bits from a same first encoded data stream, wherein S_0 is a positive integer.

[Claim 8] The method according to claim 7, wherein every L_1 consecutive bits in the second encoded data stream are distributed into one third encoded data stream, wherein L_1 is a positive integer, and L_1 is an integer multiple of $S_0 \times M/W$.

[Claim 9] The method according to any one of claims 7 to 8, wherein $S_0 = 2 \times q$.

[Claim 10] The method according to any one of claims 1 to 9, wherein M=4, and W=2; M=2, and W=2; or M=4, and W=4.

[Claim 11] The method according to any one of claims 1 to 10, wherein performing FEC encoding processing on the to-be-sent bit data stream, to obtain the M first encoded data streams comprises:

performing FEC encoding on every 2×M bit sequences in the to-be-sent bit data stream in parallel, to obtain 2×M fifth encoded data streams, wherein each of the

2×M bit sequences comprises a plurality of bits; and

performing interleaving processing on every two fifth encoded data streams in the 2×M fifth encoded data streams, to obtain the M first encoded data streams.

[Claim 12] The method according to any one of claims 1 to 11, wherein 16 quadrature amplitude modulation, 16QAM, modulation is used for the symbol mapping processing.

[Claim 13] The method according to any one of claims 1 to 12, wherein the FEC encoding processing further comprises the probabilistic constellation shaping, PCS, processing.

[Claim 14] The method according to claim 13, wherein during the FEC encoding processing, 3552 to-be-encoded bits are encoded to obtain 4096 encoded bits, and wherein 2048 of the 3552 to-be-encoded bits are obtained through the PCS processing, and the other 1504 bits are obtained without the PCS processing.

[Claim 15] A data processing method in optical communication, comprising:

obtaining W first dual-polarization symbol data streams, wherein W is an integer greater than 1, each of the W first dual-polarization symbol data streams is located in two orthogonal polarization directions; and

performing second data processing on the W first dual-polarization symbol data streams, to obtain M first encoded data streams, wherein

M is an integer greater than 1, the second data processing comprises symbol demapping processing, and $q \times P$ bits obtained by performing symbol demapping processing on P consecutive symbols in the first dual-polarization symbol data stream are distributed into at least two of the M first encoded data streams in either polarization direction, wherein P is an integer greater than 1, and q is a positive integer; and in either polarization direction, q bits are obtained by performing symbol demapping processing on each symbol; and

performing FEC decoding processing on the M first encoded data streams, to obtain a to-be-received bit data stream.

[Claim 16] A data processing apparatus in optical communication, wherein the data processing apparatus is configured to perform the data processing method according to any one of claims 1 to 15.

[Claim 17] An optical module, configured to perform the data processing method according to any one of claims 1 to 15.

[Claim 18] An optical communication system, wherein the system comprises a transmitting side apparatus and a receiving side apparatus; the transmitting side apparatus is configured to perform the data processing method according to any one of claims 1

to 14; and the receiving side apparatus is configured to perform the data processing method according to claim 15.

[Claim 19] A computer-readable storage medium, wherein the computer-readable storage medium stores instructions; and when the instructions are run on a processor, the processor is enabled to perform the data processing method according to any one of claims 1 to 15.