CLAIMS

1. A DC transformation system comprising:

a rectifier configured to rectify AC power supplied from an AC power source and output a first DC voltage;

a first power conversion device connected in series to the rectifier and configured to output a second DC voltage;

a second power conversion device connected in parallel to the rectifier and configured to convert power supplied from the rectifier to supply the converted power to the first power conversion device; and

a control device configured to control the first power conversion device to cause an addition/subtraction voltage of the first DC voltage and the second DC voltage to be a predetermined voltage,

wherein

the first power conversion device comprises:

first and second switching elements connected in series between terminals of the second power conversion device;

a reactor connected between a neutral point of the first and second switching elements and an output terminal on a high-tension side; and

a capacitor connected in parallel to the first and second switching elements connected in series,

each of the first and second switching elements comprises a semiconductor switching element and an antiparallel diode, and

the control device executes PWM control on the first and second switching elements.

2. The system of Claim 1, wherein the second DC voltage is equal to or lower than the first DC voltage.

3. The system of Claim 1 or 2, wherein the rectifier is a diode rectifier.

4. The system of any one of Claims 1 to 3, further comprising a diode connected in antiparallel between a terminal on a high-tension side of the first power conversion device and a terminal on a low-tension side of the rectifier.

5. A DC transformation system comprising:

a rectifier configured to rectify AC power supplied from an AC power source and output a first DC voltage;

a first power conversion device connected in series to the rectifier and configured to output a second DC voltage;

a second power conversion device connected in parallel to the rectifier and configured to convert power supplied from the rectifier to supply the converted power to the first power conversion device; and

a control device configured to control the first power conversion device to cause an addition/subtraction voltage of the first DC voltage and the second DC voltage to be a predetermined voltage,

wherein

the first power conversion device is configured to include a plurality of sets of two switching elements connected in series, the sets being connected in parallel between output terminals of the second power conversion device, and

the control device executes interleaved control in which each set of the switching elements is turned on at a predetermined timing to decrease predetermined harmonics.

6. The system of any one of Claims 1 to 5, wherein the control device stops operations of the first power conversion device and the

second power conversion device when an opposite current flows in the first power conversion device.

7. The system of any one of Claims 1 to 6, wherein

the second power conversion device comprises:

first and second switching elements connected in series between DC terminals on an input side;

third and fourth switching elements connected in parallel to the first and second switching elements;

a primary coil, a resonant reactor, and a resonant capacitor connected between a neutral point of the third and fourth switching elements and a neutral point of the first and second switching elements;

a secondary coil configured to constitute an isolation transformer along with the primary coil; and

an AC/DC converter connected to the secondary coil and having the first power conversion device connected between DC terminals on an output side, and

each of the first to fourth switching elements comprises a semiconductor switching element and an antiparallel diode, and soft-switching is performed due to resonance of the resonant reactor and the resonant capacitor.