CLAIMS

1. An antenna device of a magnetic coupling type for magnetically coupling to magnetic flux generated from another antenna device in another communication party to perform communication, the antenna device comprising:

a magnetic body having a plate-like shape; and

a coil configured to be wound around the magnetic body such that an angle between the coil and a short direction of the magnetic body on a side of the magnetic body including a longitudinal direction and the short direction of the magnetic body is the same as an angle between the coil and the short direction of the magnetic body on another side of the magnetic body including the longitudinal direction and the short direction,

wherein the magnetic body has flexibility; and

a communication distance is determined by at least one of a thickness of the magnetic body and a space between wires of the coil .

2. The antenna device as claimed in claim 1 wherein the coil is wound around the magnetic body so that the coil forms a loop in a short direction of the magnetic body.

3. The antenna device as claimed in claim 1 or 2 wherein the coil is wound in a state where the coil has an interval between the adjacent loops.

4. The antenna device as claimed in any one of claims 1 to 3 further includes a metal plate, on a side of which the magnetic body is arranged.

5. An antenna device of a magnetic coupling type for magnetically coupling to magnetic flux generated from another antenna device in another communication party to perform communication, the antenna device comprising:

a magnetic body including a first magnetic body part having a plate-like shape; and a second magnetic body part having a plate-like shape, and is connected at an angle to the first magnetic body part;

a first antenna which has a coiled shape and is wound around the first magnetic body part; and

a second antenna which has a coiled shape and is wound around the second magnetic body part, and generates a magnetic field, a polarity of which is opposite to a polarity of a magnetic field generated by the first antenna,

wherein the first magnetic body part and the second magnetic body part have flexibility;

wherein the first antenna is configured to be wound around the first magnetic body part such that an angle between the coil and a short direction of the first magnetic body part on a side of the first magnetic body part, including a longitudinal direction and the short direction of the first magnetic body part, is the same as an angle between the coil and the short direction of the first magnetic body part on another side of the first magnetic body part including the longitudinal direction and the short direction; and

wherein the second antenna is configured to be wound around the second magnetic body part such that an angle between the coil and a short direction of the second magnetic body part on a side of the second magnetic body part, including a longitudinal direction, and the short direction of the second magnetic body part is the same as an angle between the coil and the short direction of the second magnetic body part on another side of the second magnetic body part including the longitudinal direction and the short direction .

6. The antenna device as claimed in claim 5 wherein the first antenna is wound around the first magnetic body part so that the first antenna forms a loop in a short direction of the first magnetic body part, and the second antenna is would around the second magnetic body part so that the second antenna forms a loop in a short direction of the second magnetic body part.

7. The antenna device as claimed in claim 5 or 6 wherein the first antenna is wound in a state where the first antenna has an interval between the adjacent loops, and the second antenna is wound in a state where the second antenna has an interval between the adjacent loops.

CLAIMS

1. An antenna device of a magnetic coupling type for magnetically coupling to magnetic flux generated from another antenna device in another communication party to perform communication, the antenna device comprising:

a magnetic body having a plate-like shape; and

a coil configured to be wound around the magnetic body such that an angle between the coil and a short direction of the magnetic body on a side of the magnetic body including a longitudinal direction and the short direction of the magnetic body is the same as an angle between the coil and the short direction of the magnetic body on another side of the magnetic body including the longitudinal direction and the short direction,

wherein the magnetic body has flexibility; and

a communication distance is determined by at least one of a thickness of the magnetic body and a space between wires of the coil,

wherein the antenna device further includes a metal plate, on a side of which the magnetic body is arranged such that a magnetic field generated by an electric current in the coil is in the same direction as a magnetic field generated by a mirror current of the electric current due to the metal plate.

2. The antenna device as claimed in claim 1 wherein the coil is wound around the magnetic body so that the coil forms a loop in a short direction of the magnetic body.

3. The antenna device as claimed in claim 1 or 2 wherein the coil is wound in a state where the coil has an interval between the adjacent loops.

4. An antenna device of a magnetic coupling type for magnetically coupling to magnetic flux generated from another antenna device in another communication party to perform communication, the antenna device comprising:

a magnetic body including a first magnetic body part having a plate-like shape; and a second magnetic body part having a plate-like shape, and is connected at an angle to the first magnetic body part;

a first antenna which has a coiled shape and is wound around the first magnetic body part; and

a second antenna which has a coiled shape and is wound around the second magnetic body part, and generates a magnetic field, a polarity of which is opposite to a polarity of a magnetic field generated by the first antenna,

wherein the first magnetic body part and the second magnetic body part have flexibility;

wherein the first antenna is configured to be wound around the first magnetic body part such that an angle between the coil and a short direction of the first magnetic body part on a side of the first magnetic body part, including a longitudinal direction and the short direction of the first magnetic body part, is the same as an angle between the coil and the short direction of the first magnetic body part on another side of the first magnetic body part including the longitudinal direction and the short direction; and

wherein the second antenna is configured to be wound around the second magnetic body part such that an angle between the coil and a short direction of the second magnetic body part on a side of the second magnetic body part, including a longitudinal direction, and the short direction of the second magnetic body part is the same as an angle between the coil and the short direction of the second magnetic body part on another side of the second magnetic body part including the longitudinal direction and the short direction,

wherein the antenna device further includes a metal plate, on a side of which the first magnetic body part and the second magnetic body part are arranged such that a magnetic field generated by an electric current in the coil is in the same direction as a magnetic field generated by a mirror current of the electric current due to the metal plate.

5. The antenna device as claimed in claim 4 wherein the first antenna is wound around the first magnetic body part so that the first antenna forms a loop in a short direction of the first magnetic body part, and the second antenna is would around the second magnetic body part so that the second antenna forms a loop in a short direction of the second magnetic body part.

6. The antenna device as claimed in claim 4 or 5 wherein the first antenna is wound in a state where the first antenna has an interval between the adjacent loops, and the second antenna is wound in a state where the second antenna has an interval between the adjacent loops.