scattered waves relative to radio waves incident on the object is easy as it is a forward problem. However, calculating the state of the interior of an object when it is the measurement data that is known is difficult as it is an inverse problem.

[0006]

Even if the presence of an element inside an object can be identified using scattered waves, it is not easy to identify the characteristics of the element, for example, whether the element is persistent in the object or not. More specifically, if a persistent malignant tumor and other cells that randomly appear and disappear reflect radio waves in the same way, it is not easy to identify whether an element inside the human body is a malignant tumor or another cell using scattered waves.

[0007]

In view of this, embodiments of the present disclosure provide a scattering tomography device and the like that can generate a reconstructed image showing persistent elements in an object using scattered waves of radio waves.

[Solution to Problem]

[0008]

According to a first aspect of the present disclosure, there is provided a scattering tomography device including: a transmitting antenna that transmits radio waves into an interior of an object from outside the object; a receiving antenna that receives, outside the object, scattered waves of the radio waves transmitted into the interior of the object by the transmitting antenna; and an information processing circuit that obtains a measurement result of the scattered waves on each of a plurality of days to obtain measurement results over a plurality of days, and generates a reconstructed image showing a persistent element inside the object based on the measurement results. The information processing circuit: calculates, for each of the measurement results and using the

measurement result as a boundary condition, a scattering field function that takes a transmission position of the radio waves and a reception position of the scattered waves as inputs and outputs an amount of the scattered waves at the reception position; calculates, for each of the measurement results, a visualization function that takes a location to be visualized as an input and outputs an image intensity at the location to be visualized, and is defined based on the amount output from the scattering field function in response to inputting the location to be visualized into the scattering field function as the transmission position and the reception position; generates an intermediate image for each of the measurement results based on the visualization function to generate intermediate images for the measurement results; and generates the reconstructed image by calculating a minimum value of the image intensity at each position in the intermediate images using a logical conjunction.

[0008a]

According to a second aspect of the present disclosure, there is provided a scattering tomography method including: transmitting, by a transmitting antenna, radio waves into an interior of an object from outside the object; receiving outside the object, by a receiving antenna, scattered waves of the radio waves transmitted into the interior of the object by the transmitting antenna; and obtaining a measurement result of the scattered waves on each of a plurality of days to obtain measurement results over a plurality of days, and generating a reconstructed image showing a persistent element inside the object based on the measurement results, wherein the obtaining of measurement results and generating of a reconstructed image includes: calculating, for each of the measurement results and using the measurement result as a boundary condition, a scattering field function that takes a transmission position of the radio waves and a reception position of the scattered waves as inputs and outputs an amount of the scattered waves at the reception position; calculating, for each of the measurement results, a visualization

function that takes a location to be visualized as an input and outputs an image intensity at the location to be visualized, and is defined based on the amount output from the scattering field function in response to inputting the location to be visualized into the scattering field function as the transmission position and the reception position; generating an intermediate image for each of the measurement results based on the visualization function to generate intermediate images for the measurement results; and generating the reconstructed image by calculating a minimum value of the image intensity at each position in the intermediate images using a logical conjunction.

[0009]

These general or specific aspects may be implemented as a system, a device or apparatus, a method, an integrated circuit, a computer program, or a non-transitory computer-readable recording medium such a CD-ROM, or any combination thereof.

[Advantageous Effects of Invention]

[0010]

According to embodiments of the present disclosure, it is possible to generate a reconstructed image showing persistent elements in an object using scattered waves of radio waves.

[Brief Description of Drawings]

[0011]

[FIG. 1]

FIG. 1 is a graph illustrating the secretion of progesterone and other hormones during the menstrual cycle.

[FIG. 2A]

FIG. 2A is a graph illustrating the frequency of cell multiplication (mitosis) of the lobules plotted against day of the menstrual cycle.

[FIG. 2B]

FIG. 2B is a graph illustrating the frequency of cell deletion (apoptosis) plotted against day of the menstrual cycle.

[FIG. 3]