variation pattern acquisition unit which, from time-series change in water quality information of the treatment target water acquired in advance, acquires a plurality of water quality variation patterns each according to a condition at a time of acquisition of the water quality information acquired in advance; an inflow water quality estimation unit which selects one water quality variation pattern that matches a condition at a time of acquisition of the water quality measurement value at the first time point, from the plurality of water quality variation patterns included in the water quality variation pattern acquisition unit, and estimates an inflow water quality value subsequent to the first time point on the basis of the selected one water quality variation pattern and the water quality measurement value at the first time point acquired by the first water quality measurement value acquisition unit; and a control unit which controls an aeration amount of the blower subsequent to the first time point, on the basis of the inflow water quality value estimated by the inflow water quality estimation unit.

EFFECT OF THE INVENTION

[0009] The water treatment system according to the present disclosure can estimate an inflow water quality value with high accuracy without using a measurement instrument capable of continuously measuring the inflow water quality and supply a necessary amount of aeration in accordance with variation in the inflow water quality value, thus suppressing variation in a treated water quality value and reducing excessive

CLAIMS

[Claim 1] A water treatment system for performing water treatment through biological oxidation while performing aeration from a blower to a reaction tank, the water treatment system comprising:

a first water quality measurement value acquisition unit which acquires a water quality measurement value at a first time point, of treatment target water flowing into the reaction tank;

a water quality variation pattern acquisition unit which, from time-series change in water quality information of the treatment target water acquired in advance, acquires a plurality of water quality variation patterns each according to a condition at a time of acquisition of the water quality information acquired in advance;

an inflow water quality estimation unit which selects one water quality variation pattern that matches a condition at a time of acquisition of the water quality measurement value at the first time point, from the plurality of water quality variation patterns included in the water quality variation pattern acquisition unit, and estimates an inflow water quality value subsequent to the first time point on the basis of the selected one water quality variation pattern and the water quality measurement value at the first time point acquired by the first water quality measurement

value acquisition unit; and

a control unit which controls an aeration amount of the blower subsequent to the first time point, on the basis of the inflow water quality value estimated by the inflow water quality estimation unit.

[Claim 2] The water treatment system according to claim 1, further comprising a second water quality measurement value acquisition unit, wherein

the second water quality measurement value acquisition unit acquires a water quality measurement value of treated water that has been treated in the reaction tank, and

the control unit further controls the aeration amount of the blower subsequent to the first time point, on the basis of the water quality measurement value of the treated water acquired by the second water quality measurement value acquisition unit.

[Claim 3] The water treatment system according to claim 1 or 2, wherein

the inflow water quality estimation unit includes

a learning device including a data acquisition unit which acquires time-series change in water quality information of the treatment target water, as training data,

in advance, and a model generation unit which generates a trained model for inferring a plurality of the water quality variation patterns each of which is time-series change according to a condition at a time of acquisition of the water quality information, using the training data, and

an inference device which infers the inflow water quality value subsequent to the first time point, from the water quality measurement value at the first time point of the treatment target water acquired by the first water quality measurement value acquisition unit, using the trained model.

[Claim 4] An aeration amount control device used for a water treatment system for performing water treatment through biological oxidation while performing aeration from a blower to a reaction tank, the aeration amount control device comprising:

a first water quality measurement value acquisition unit which acquires a water quality measurement value at a first time point, of treatment target water flowing into the reaction tank;

a water quality variation pattern acquisition unit which, from time-series change in water quality information of the treatment target water acquired in advance, acquires a plurality of water quality variation patterns each according

to a condition at a time of acquisition of the water quality information acquired in advance;

an inflow water quality estimation unit which selects one water quality variation pattern that matches a condition at a time of acquisition of the water quality measurement value at the first time point, from the plurality of water quality variation patterns included in the water quality variation pattern acquisition unit, and estimates an inflow water quality value subsequent to the first time point on the basis of the selected one water quality variation pattern and the water quality measurement value at the first time point acquired by the first water quality measurement value acquisition unit; and

a target aeration amount calculation unit which calculates a target aeration amount of aeration to be supplied from the blower to the reaction tank subsequent to the first time point, on the basis of the inflow water quality value estimated by the inflow water quality estimation unit.

[Claim 5] The aeration amount control device according to claim 4, wherein

the first water quality measurement value acquisition unit acquires a water quality measurement value of treatment target water flowing into the reaction tank at a

second time point subsequent to the first time point, and

the inflow water quality estimation unit selects the water quality variation pattern from the water quality variation pattern acquisition unit, correspondingly to acquisition date and time of the water quality measurement value at the second time point acquired by the first water quality measurement value acquisition unit, and estimates an inflow water quality value subsequent to the second time point.

[Claim 6] The aeration amount control device according to claim 4 or 5, wherein

the inflow water quality estimation unit includes a rain influence determination unit which determines whether the water quality measurement value acquired by the first water quality measurement value acquisition unit has been influenced by rain, and

in a case where the rain influence determination unit determines that the water quality measurement value has been influenced, the inflow water quality value subsequent to the first time point is estimated on the basis of a rain influence degree and the water quality variation pattern selected from the water quality variation pattern acquisition unit.

[Claim 7] The aeration amount control device according to any one of claims 4 to 6, further comprising a second water quality measurement value acquisition unit, wherein

the second water quality measurement value acquisition unit acquires a water quality measurement value of treated water that has been treated in the reaction tank, and

the target aeration amount calculation unit calculates the target aeration amount of aeration to be supplied from the blower to the reaction tank, on the basis of the inflow water quality value estimated by the inflow water quality estimation unit and the water quality measurement value of the treated water acquired by the second water quality measurement value acquisition unit.

[Claim 8] An aeration amount control method used for a water treatment system for performing water treatment through biological oxidation while performing aeration from a blower to a reaction tank, the aeration amount control method comprising:

a water quality variation pattern acquisition step of, from time-series change in water quality information of treatment target water flowing into the reaction tank in advance, acquiring a plurality of water quality variation patterns according to a condition at a time of acquisition of

the water quality information acquired in advance;

a water quality measurement value acquisition step of acquiring a water quality measurement value at a first time point, of the treatment target water flowing into the reaction tank;

an inflow water quality estimation step of selecting one water quality variation pattern that matches an acquisition condition for the water quality measurement value at the first time point, from a plurality of the water quality variation patterns acquired in the water quality variation pattern acquisition step, and estimating an inflow water quality value subsequent to the first time point on the basis of the selected one water quality variation pattern and the water quality measurement value at the first time point acquired in the first water quality measurement value acquisition step; and

a target aeration amount calculation step of calculating a target aeration amount of aeration to be supplied from the blower to the reaction tank subsequent to the first time point, on the basis of the inflow water quality value estimated in the inflow water quality estimation step.