[CLAIMS]

[Claim 1]

A train traffic control inspection device that verifies an operation of a train traffic control system including an interlock system and a traffic control system, the train traffic control inspection device comprising:

an information acquiring unit configured to acquire railroad topology information indicating a configuration of a railroad network in which a plurality of blocks are connected and which includes one or more branches, travel path information specifying a path of a train which travels on the railroad network by combination of one or more routes for each train, route setting information in which conditions to be satisfied when a route request for reserving a path on which a train will travel is given are defined for each route, and interlock system operation information in which safe operation logics of the interlock system are defined;

a state transition model generating unit configured to generate a state transition model for each of the train, the branch, the interlock system, and the traffic control system based on the information acquired by the information acquiring unit; and

a state transition model inspecting unit configured to determine whether a predetermined requirement is satisfied by combinations of states assumed in the train, the branch, the interlock system, and the traffic control system depending on the state transition models.

[Claim 2]

The train traffic control inspection device according to claim 1, wherein the state transition model generating unit generates a state transition model including at least a state in which the train is in each route element obtained by dividing the route in units of the blocks and a state in which the train crosses a boundary of each route element as the

states assumed in the train.

[Claim 3]

The train traffic control inspection device according to claim 1, wherein the state transition model generating unit generates a state transition model including at least a forward-opened state, an in-switching state, and a reversely-opened state as the states assumed in the branch.

[Claim 4]

The train traffic control inspection device according to claim 1, wherein the state transition model generating unit generates a state transition model including at least a state indicating whether each route is locked and a state indicating whether a train is present in each block as the states assumed in the interlock system.

[Claim 5]

The train traffic control inspection device according to claim 1, wherein the state transition model generating unit generates a state transition model including at least a progress state of a route request step for each train and a state indicating whether a route request for each route is present as the states assumed in the traffic control system.

[Claim 6]

A train traffic control inspection method of verifying an operation of a train traffic control system including an interlock system and a traffic control system, the train traffic control inspection method comprising:

acquiring railroad topology information indicating a configuration of a railroad network in which a plurality of blocks are connected and which includes one or more branches, travel path information specifying a path of a train which travels in the railroad network on a combination of one or more routes for each train, route setting information in which conditions to be satisfied when a route request for reserving a path on which a

train will travel is given are defined for each route, and interlock system operation information in which safe operation logics of the interlock system are defined;

generating a state transition model for each of the train, the branch, the interlock system, and the traffic control system based on the acquired information; and

determining whether a predetermined requirement is satisfied by combinations of states assumed in the train, the branch, the interlock system, and the traffic control system depending on the state transition models.

[Claim 7]

A program causing a computer of a train traffic control inspection device, which verifies an operation of a train traffic control system including an interlock system and a traffic control system, to serve as:

information acquiring means configured to acquire railroad topology information indicating a configuration of a railroad network in which a plurality of blocks are connected and which includes one or more branches, travel path information specifying a path of a train which travels in the railroad network on a combination of one or more routes for each train, route setting information in which conditions to be satisfied when a route request for reserving a path on which a train will travel is given are defined for each route, and interlock system operation information in which safe operation logics of the interlock system are defined;

state transition model generating means configured to generate a state transition model for each of the train, the branch, the interlock system, and the traffic control system based on the information acquired by the information acquiring unit; and

state transition model inspecting means configured to determine whether a predetermined requirement is satisfied by combinations of states assumed in the train, the branch, the interlock system, and the traffic control system depending on the state

transition models.

[CLAIMS]

[Claim 1]

A train traffic control inspection device that verifies an operation of a train traffic control system including an interlock system and a traffic control system, the train traffic control inspection device comprising:

an information acquiring unit configured to acquire railroad topology information indicating a configuration of a railroad network in which a plurality of blocks are connected and which includes one or more branches, travel path information specifying a path of a train which travels on the railroad network by combination of one or more routes for each train, route setting information in which conditions to be satisfied when a route request for reserving a path on which a train will travel is given are defined for each route, and interlock system operation information in which safe operation logics of the interlock system are defined;

a state transition model generating unit configured to generate a state transition model for each of the train, the branch, the interlock system, and the traffic control system based on the information acquired by the information acquiring unit; and

a state transition model inspecting unit configured to determine whether a predetermined requirement is satisfied by each combination of states which is able to occur while transiting the present state in either the train, the branch, the interlocking system or the traffic control system to other states depending on the state transition caused in either the train, the branch, the interlocking system or the traffic control system based on the state transition models.

[Claim 2]

The train traffic control inspection device according to claim 1, wherein the state transition model generating unit generates a state transition model including at least a

state in which the train is in each route element obtained by dividing the route in units of the blocks and a state in which the train crosses a boundary of each route element as the states assumed in the train.

[Claim 3]

The train traffic control inspection device according to claim 1, wherein the state transition model generating unit generates a state transition model including at least a forward-opened state, an in-switching state, and a reversely-opened state as the states assumed in the branch.

[Claim 4]

The train traffic control inspection device according to claim 1, wherein the state transition model generating unit generates a state transition model including at least a state indicating whether each route is locked and a state indicating whether a train is present in each block as the states assumed in the interlock system.

[Claim 5]

The train traffic control inspection device according to claim 1, wherein the state transition model generating unit generates a state transition model including at least a progress state of a route request step for each train and a state indicating whether a route request for each route is present as the states assumed in the traffic control system.

[Claim 6]

A train traffic control inspection method of verifying an operation of a train traffic control system including an interlock system and a traffic control system, the train traffic control inspection method comprising:

acquiring railroad topology information indicating a configuration of a railroad network in which a plurality of blocks are connected and which includes one or more branches, travel path information specifying a path of a train which travels in the railroad

network on a combination of one or more routes for each train, route setting information in which conditions to be satisfied when a route request for reserving a path on which a train will travel is given are defined for each route, and interlock system operation information in which safe operation logics of the interlock system are defined;

generating a state transition model for each of the train, the branch, the interlock system, and the traffic control system based on the acquired information; and

determining whether a predetermined requirement is satisfied by each combination of states which is able to occur while transiting the present state in either the train, the branch, the interlocking system or the traffic control system to other states depending on the state transition caused in either the train, the branch, the interlocking system or the traffic control system based on the state transition models.

[Claim 7]

A program causing a computer of a train traffic control inspection device, which verifies an operation of a train traffic control system including an interlock system and a traffic control system, to serve as:

information acquiring means configured to acquire railroad topology information indicating a configuration of a railroad network in which a plurality of blocks are connected and which includes one or more branches, travel path information specifying a path of a train which travels in the railroad network on a combination of one or more routes for each train, route setting information in which conditions to be satisfied when a route request for reserving a path on which a train will travel is given are defined for each route, and interlock system operation information in which safe operation logics of the interlock system are defined;

state transition model generating means configured to generate a state transition model for each of the train, the branch, the interlock system, and the traffic control

system based on the information acquired by the information acquiring unit; and

state transition model inspecting means configured to determine whether a predetermined requirement is satisfied by each combination of states which is able to occur while transiting the present state in either the train, the branch, the interlocking system or the traffic control system to other states depending on the state transition caused in either the train, the branch, the interlocking system or the traffic control system based on the state transition models.