Claims

[Claim 1]

A construction planning simulation system for construction using a crane for acquiring information about possibility of interference between an external object and an attachment of the crane and a suspended cargo suspended by an upper tip of the attachment, the crane having a lower travel body, an upper turning body, a support unit and the attachment that is supported by the support unit for suspending the cargo and that extends outward so as to allow derricking, comprising:

a first input acquisition unit that acquires masses of the attachment and the suspended cargo as first input;

a second input acquisition unit that acquires information about a posture of the attachment as second input;

a position estimation unit that models a 3 dimensional model of the crane based on the first input and the second input and estimates a position of the attachment and the suspended cargo based on the 3 dimensional model of the crane; and

an information derivation unit that derives information about the possibility of interference between the external object and the attachment and the suspended cargo, based on the position of at least one of the attachment and the suspended cargo estimated by the position estimation unit,

the information about the posture includes a derricking angle of the attachment, and

the position estimation unit estimates the position of at least one of the attachment and the suspended cargo, based on the derricking angle.

[Claim 2]

The construction planning simulation system according to claim 1, wherein the position estimation unit estimates a deformation amount of the support unit and a deformation amount of the attachment based on the first input and the second input, and estimates the position of at least one of the attachment and the suspended cargo that is determined depending on the deformation amounts.

[Claim 3]

The construction planning simulation system according to claim 1 or 2, wherein

the information about the posture includes at least one of lifting speed at time of lifting the suspended cargo and lowering speed at time of lowering the suspended cargo, and

the position estimation unit estimates the position of at least one of the attachment and the suspended cargo, based on at least one of the lifting speed and the lowering speed.

[Claim 4]

The construction planning simulation system according to any one of claims 1 to 3, wherein

the position estimation unit estimates a deformation amount of the attachment, based on the information about the posture and on a deformation state definition table defining a deformation state of the attachment per mass of the suspended cargo, and estimates the position of at least one of the attachment and the suspended cargo depending on the deformation amount.

[Claim 5]

A construction planning simulation system for construction using a crane for acquiring information about possibility of interference between an external object and an attachment of the crane and a suspended cargo suspended by an upper tip of the attachment, the crane having a lower travel body, an upper turning body, a support unit and the attachment that is supported by the support unit for suspending the cargo and that extends outward so as to allow derricking, comprising:

a first input acquisition unit that acquires masses of the attachment and the suspended cargo as first input;

a second input acquisition unit that acquires information about a change in posture of the attachment over prescribed time as second input;

a position estimation unit that models a 3 dimensional model of the crane based on the first input and the second input and estimates a position of the attachment and the suspended cargo for the prescribed time, based on the 3 dimensional model of the crane;

an information derivation unit that derives information about the possibility of interference between the external object and the attachment and the suspended cargo, based

on the position of at least one of the attachment and the suspended cargo estimated by the position estimation unit,

the information about the posture includes a derricking angle of the attachment, and

the position estimation unit estimates the position of at least one of the attachment and the suspended cargo, based on the derricking angle.

[Claim 6]

The construction planning simulation system according to claim 5, wherein the position estimation unit estimates a deformation amount of the support unit and a deformation amount of the attachment over the prescribed time, based on the first input and the second input, and estimates the position of at least one of the attachment and the suspended cargo that is determined depending on the deformation amounts.

[Claim 7]

The construction planning simulation system according to claim 5 or 6, wherein

the information about the change in posture includes acceleration during derricking of the attachment, and

the position estimation unit estimates the position of at least one of the attachment and the suspended cargo, based on the acceleration during the derricking.

[Claim 8]

The construction planning simulation system according to any one of claims 5 to 7, wherein

the information about the change in posture includes acceleration during turning of the attachment, and

the position estimation unit estimates the position based on the acceleration during the turning.

[Claim 9]

The construction planning simulation system according to any one of claims 5 to 8, wherein

the information about the change in posture includes at least one of lifting speed at time of lifting the suspended cargo and lowering speed at time of lowering the suspended

cargo, and

the position estimation unit estimates the position based on the lifting speed at the time of lifting or the lowering speed at the time of lowering.

[Claim 10]

The construction planning simulation system according to any one of claims 5 to 9, wherein

the position estimation unit estimates a deformation amount of the attachment over the prescribed time, based on the posture of the attachment and a deformation state definition table defining a deformation state of the attachment per mass of the suspended cargo, and estimates the position of at least one of the attachment and the suspended cargo that is determined depending on the deformation amounts.