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DESCRIPTION

STAGE APPARATUS

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Technical Field

The present invention relates to a stage apparatus used on a vibration isolation table.

Background Art

Conventionally, in order to inspect a defect of a
10 glass substrate of a flat panel display (FPD), a
typical example of which is a liquid crystal display, a
glass substrate to be inspected is placed on a stage
which can be moved in two axial directions of XY.
Then, while moving the stage, the surface of the glass
15 substrate is magnified using a microscope or the like,
and a defect is observed.

FIG. 11 is a structural diagram showing an example
of a stage apparatus used for a defect inspection such
as described above. In this apparatus, a vibration
20 isolation table 3 having an air spring 3a and a surface
plate 3b is placed on two or four support table 1. On
the vibration isolation table 3, a stage 4 designed to
be movable in two axial directions of XY, which cross
orthogonally is mounted, and an object 5 to be
25 examined, such as a glass substrate is to be placed on
this stage 4. Further, a microscope 7 is supported on
the vibration isolation table 3 by means of an

arm-shaped frame 6 such that the microscope 7 is situated above the to-be-examined object 5 placed on the stage 4. With this structure, while adjusting the relative position of the object 5 with respect to the microscope 7 by moving the stage 4 in the XY directions, the surface of the object 5 can be observed with a magnified view thereof.

In the case of this structure, the stage 4 is moved in the two axial direction of XY via a ball spring 10 by means of an acceleration/deceleration device 9 such as a servo motor controlled by a control apparatus 8. Here, in the case where a servo motor is used as the acceleration/deceleration device 9, a target moving amount and a target speed are input using an input device 11, and then the input device 11 outputs the target moving amount and the target speed to the control device 8. Thus, control signals for the target moving amount and the target speed are output from the control device 8 to the acceleration/deceleration device 9, and thus the stage 4 is moved accordingly.

It should be noted here that in the case where the stage 4 is controlled full-automatically, a device which has been programmed for the motion of the stage 4 in advance, such as a computer, can be used in place of the input device 11. Further, in some cases, while the user of the apparatus monitoring an observation image

taken by the microscope 7, the stage 4 is controlled manually with use of an input device such as a joystick or button switch (to be referred to as button hereinafter).

5 However, such a stage apparatus entails a problem that the vibration isolation table 3 is rolled due to a stress created by acceleration and deceleration of the stage 4 when it is moved by the acceleration/
10 deceleration device 9. The stage 4 is supported on the support table 1 via the vibration isolation table 3 so that the vibration from the floor cannot be propagated to the stage 4. However, the vibration isolation table 3 has a structure in which the surface plate 3b is
15 elastically supported by the air spring 3a. With this structure, when the acceleration/deceleration of the stage 4 is repeated on the vibration isolation stage 3, the surface plate 3b elastically supported by the air
20 spring 3a is rolled due to a stress created each time the stage is accelerated or decelerated. When the rolling of the surface plate 3b is large, the rolled is propagated to the frame 6 which supports the microscope 7 on the surface plate 3b. This oscillation may cause a blurring of microscopic observation image.

25 Under these circumstances, conventionally, as a countermeasure for the rolling of the vibration isolation table, such an apparatus as disclosed in, for example, Jpn. Pat. Appln. KOKAI Publication

No. 7-307279 is considered. This apparatus uses an active vibration isolation table, and a surface plate of this vibration isolation table is controlled with use of an actuator, in order to suppress the rolling.

5 However, with such a means, an actuator for controlling the surface plate and a control system for the actuator are required. Therefore, the structure of the apparatus becomes complex and the production cost of the apparatus becomes high, which are not desirable.

10 Further, Jpn. Pat. Appln. KOKAI Publication No. 8-111374 proposes other apparatus as a countermeasure different from the above. This apparatus takes such a structure that the stress due to the acceleration or deceleration of the stage is not
15 propagated to the vibration isolation table. That is, in this apparatus, the frame on which the acceleration/deceleration driving device for the stage is mounted is prepared as a separate member from the vibration isolation table and fixed to the floor. With this
20 structure, the stress created while acceleration or deceleration is added only to the frame not to the vibration isolation table, and thus the rolling of the vibration isolation caused by the stress creating while acceleration or deceleration is prevented. However,
25 with such a means, an acceleration/deceleration driving device for the stage is required. Therefore, the structure of the apparatus becomes complex and the

production cost of the apparatus becomes high.

Further, the contact area of the apparatus with respect to the floor becomes larger, which is not desirable.

Further, Jpn. Pat. Appln. KOKAI Publication
5 No. 10-144601 proposes other apparatus as a
countermeasure different from the above. This
apparatus takes such a structure that the rolling of
the vibration isolation table is suppressed with use of
an order value for the acceleration/deceleration of the
10 stage, which has been obtained by a simulation.
However, with such a countermeasure, the order value is
so complicated that it is not suitable for the movement
of the stage having such a long stroke which, requires
a time period several times larger than the rolling
15 period of the vibration isolation table, thus creating
a problem.

Therefore, the object of the present invention is
to provide a stage apparatus which can effectively
suppress the rolling of the vibration isolation table,
20 caused by the stress created while accelerating or
decelerating the stage.

Disclosure of Invention

According to claim 1 of the present invention,
there is provided a stage apparatus including a stage
25 mounted on a vibration isolation table, comprising:
drive means for accelerating or decelerating the stage;
input means for accepting a target movement amount for

the stage or a start signal of acceleration/
deceleration as input data; and control means for
outputting an acceleration signal to the drive means
based on the input data to the input means and
5 outputting, $n \times T$ seconds after the acceleration signal
is output (where n represents a natural number and T
represents a rolling oscillation period unique to the
vibration isolation table [in seconds]), a deceleration
signal having a same waveform as that of the
10 acceleration signal and an opposite direction thereto.

According to claim 2 of the present invention,
there is provided a stage apparatus according to
claim 1, wherein the input means is a joystick or a
button switch.

15 According to claim 3 of the present invention,
there is provided a stage apparatus including a stage
mounted on a vibration isolation table, comprising:
drive means for accelerating or decelerating the stage;
input means for accepting a target movement speed for
20 the stage as input data; and control means for
outputting a first acceleration signal to the drive
means based on the input contents to the input means
and outputting, $(n-0.5) \times T$ seconds after the first
acceleration signal is output (where n represents a
25 natural number and T represents a rolling oscillation
period unique to the vibration isolation table [in
seconds]), a second acceleration signal having a same

waveform as that of the first acceleration signal and a same direction thereto.

According to claim 4 of the present invention, there is provided a stage apparatus according to any of
5 claims 1 to 3, wherein the control means varies a variable T_c equivalent to the rolling oscillation period T unique to the vibration isolation table from outside, and controls the drive means based on the variable T_c taken as the rolling oscillation period T
10 unique to the vibration isolation table.

According to claim 5 of the present invention, there is provided a stage apparatus according to claim 4, further comprising: detection means for detecting the rolling oscillation of the vibration
15 isolation table, wherein the control means adjusts the variable T_c in accordance with the oscillation amplitude detected by the detection means.

That is, with the invention recited in claim 1, it is possible to effectively suppress the rolling of the
20 vibration isolation table while moving the stage based on a target movement amount input via the input means.

Further, with the invention recited in claim 2, it is possible to effectively suppress the rolling of the vibration isolation table 3 while moving the stage.

25 Furthermore, with the invention recited in claim 3, it is possible to effectively suppress the rolling of the vibration isolation table while moving

the stage at a constant speed based on a target movement speed input via the input means.

Furthermore, with the invention recited in claim 4, it is possible to effectively suppress the rolling of the vibration isolation table even in the case where the rolling oscillation period unique to the vibration isolation table is not known, since the apparatus can be set in an optimal state from outside.

Furthermore, with the invention recited in claim 5, it is possible to effectively suppress the rolling of the vibration isolation table since the variable T_c can be adjusted to an optimal value.

Brief Description of Drawings

FIG. 1 is a diagram schematically showing a structure of the stage apparatus according to the first to third embodiments of the present invention;

FIG. 2 is a flowchart illustrating the operation of the apparatus according to the first embodiment of the present invention;

FIG. 3 is a diagram showing waveforms illustrating the operation of the apparatus according to the first embodiment of the present invention;

FIG. 4 is another diagram showing waveforms illustrating the operation of the apparatus according to the first embodiment of the present invention;

FIG. 5 is a flowchart illustrating the operation of the apparatus according to the second embodiment of

the present invention;

FIG. 6 is a diagram showing waveforms illustrating the operation of the apparatus according to the second embodiment of the present invention;

5 FIG. 7 is a flowchart illustrating the operation of the apparatus according to the third embodiment of the present invention;

FIG. 8 is a diagram showing waveforms illustrating the operation of the apparatus according to the third
10 embodiment of the present invention;

FIG. 9 is a diagram schematically showing a structure of the stage apparatus according to the fourth embodiment of the present invention;

FIG. 10 is a diagram schematically showing a
15 structure of the stage apparatus according to the fifth embodiment of the present invention; and

FIG. 11 is a diagram schematically showing an example of the conventional stage apparatus.

Best Mode for Carrying Out of the Invention

20 Embodiments of the present invention will now be described with reference to accompanying drawings.

FIG. 1 is a diagram schematically showing a structure of the stage apparatus according to the first embodiment of the present invention. In FIG. 1, the
25 same structural elements as shown in FIG. 11 are designated by the same reference numerals.

In FIG. 1, through an input device 11, a target

movement amount of a stage 4 are inputted as input data, and then the input device 11 outputs them to a control device 8. As the input device 11, for example, a device which manually input a target movement amount
5 or a pre-programmed computer, is used.

The control device 8, although it is not particularly limited, is made of, for example, a computer, and serves to control the driver of the servo motor, which is an acceleration/deceleration device 9.
10 Further, the control device 8 calculates the degree of the acceleration of the stage 4 when the target movement amount for the stage 4 is input thereto from the input device 11.

It should be noted here that the movement amount
15 of the stage 4 in the case where a predetermined acceleration signal is output and then after $n \times T$ seconds later, a deceleration signal having the same waveform as that of the acceleration signal and an opposite direction to that, has been examined by
20 calculation or actual measurement in advance. Here, n represents a natural number and T represents a rolling oscillation period [second] unique to the vibration isolation table 3. In a practical case where a target movement amount D_1 for the stage 4 is input from the
25 input device 11, the acceleration signal (acceleration signal) A_1 of the stage 4 is obtained by the control device 8 on the basis of the following formula (1):

$$A1 = (D1 / D0) \times A0 \quad \dots (1)$$

where A0 indicates the degree of the predetermined acceleration signal and D0 indicates the movement amount of the stage 4.

5 In the above formula (1), D0 and A0 are values that have been obtained in advance and stored in the control device 8. A1 is a value indicating the degree of the acceleration speed. D1 is a value indicating the movement amount in the case where the stage is
10 accelerated or deceleration with a particular acceleration signal waveform having the degree of A1, and then moved at a constant speed for T seconds.

 The operation of the stage apparatus having the above-described structure will now be described with
15 reference to the flowchart shown in FIG. 2 as well as FIGS. 3(A) to 3(F), which illustrate waveforms regarding the stage 4 and the vibration isolation table 3.

 First, in step S101, when a target movement amount
20 D1 for the stage 4 is input from the input device 11, the control device 8 obtains by calculation an acceleration signal A1 for the stage 4 using the above-mentioned formula (1) in step S201. This acceleration signal A1 is given from the control device 8 to the
25 acceleration/deceleration device 9 at a timing indicated by FIG. 3(A) in step S202. In this manner, the stage 4 is accelerated as illustrated in FIG. 3(B),

and moved as illustrated in FIG. 3(C) in step S301.

As the stage 4 starts to accelerate based on the acceleration signal A1, the vibration isolation table 3 starts to roll due to the stress caused by the acceleration as shown in FIG. 3(D), and then is accelerated as shown in FIG. 3(E). Here, the rolling of the vibration isolation table 3 is at a rolling oscillation period T, which is unique to this table.

After that, $n \times T$ seconds after (here, $n = 1$ and T seconds later) the output of the acceleration signal A1 in step S203, as shown in FIG. 3(A), a deceleration signal A1' having the same waveform as that of the acceleration signal A1 but in an inverse direction thereto, is output from the control device 8 to the acceleration/deceleration device 9 in step S204. Then, in step S302, the stage 4 starts to decelerate; however the deceleration signal A1' has the same waveform as but in an inverse direction to that of the acceleration signal A1, and therefore the stage 4 is brought to a stop as shown in FIG. 3(B) in step S303.

On the other hand, due to the deceleration of the stage 4, a stress is applied to the vibration isolation table 3. The timing when this stress is applied is that the momentum of the vibration isolation table 3 takes a maximum peak value A2 which is in an opposite direction to the movement of the stage 4 as can be seen in FIG. 3(F). Thus, the momentum of the vibration

isolation table 3 is effectively canceled out by the stress created when the stage 4 is decelerated, and therefore the rolling can be suppressed as shown in FIG. 3(D).

5 It should be noted here that FIGS. 4(A) to 4(F) illustrate waveforms regarding the stage 4 and the vibration isolation table 3 in the case where the present invention is not employed. These figures correspond to FIGS. 3(A) to 3(F), respectively. In
10 particular, from comparison between FIG. 3(D) and FIG. 4(D), it can be well understood that the rolling of the vibration isolation table 3 is drastically suppressed by the present invention.

 According to the first embodiment, only by
15 inputting a target movement amount for the stage 4 through the input device 11 as input data, an acceleration signal is output from the control device 8 to the acceleration/deceleration device 9 on the basis of the input data, and then $n \times T$ seconds after the
20 output of the acceleration signal, a deceleration signal having the same waveform as that of the acceleration signal and an opposite direction to that, is output. In this manner, the momentum of the vibration isolation table 3 is effectively canceled out
25 by the stress created when the stage 4 is decelerated, and therefore the rolling of the vibration isolation table can be effectively suppressed.

Next, the second embodiment of the present invention will now be described. The schematic structure of the stage apparatus here is similar to that of FIG. 1 and therefore this figure will be referred to in the following explanation.

The input device 11 is supposed to be a device which can move the stage 4 with a joystick or button. In the case where the input device 11 is, for example, a button type, it can have a such a function that when the button is pressed, the stage 4 starts to move, whereas when the button is released, the movement of the stage 4 is stopped. Such a button operation is given to the control device 8 as a start signal for the acceleration or deceleration.

Further, when the button of the input device 11 is pressed, the control device 8 raises an input signal, and also generates a pulse of a rolling oscillation period T of the vibration isolation table 3 based on the rise of the input signal taken as a trigger. After that, when the button of the input device 11 is released, the control device 8 falls the input signal.

The operation of the stage apparatus having the above-described structure will now be described with reference to the flowchart shown in FIG. 5 as well as the waveforms regarding the stage 4 and the vibration isolation table 3 illustrated in FIGS. 6(A) to 6(F).

First, as the button of the input device 11 is

pressed in step S111, the control device 8 raises an input signal B1 as shown in FIG. 6(A) in step S211 and also generates a pulse B2 of a rolling oscillation period T of the vibration isolation table 3 as shown in FIG. 6(B) based on the rise of the input signal taken as a trigger. At the same time, the control device 8 outputs an acceleration signal B3 as shown in FIG. 6(C). Thus, the acceleration of the stage 4 is started in step S311.

While in the above-described state, when the button of the input device 11 is released in step S112, the input signal B1 is fallen as shown in FIG. 6(A). Then, in step S212, the control device 8 triggers at such a timing that the pulse B2 rises for the first time after the fall of the input signal B1 is triggered, and thus outputs a deceleration signal B4 as shown in FIG. 6(C). After that, in step S213, the control device 8 stops the generation of the pulse signal B2.

In this manner, $n \times T$ seconds after the output of the acceleration signal B3, a deceleration signal B4 is output and the stage 4 starts to decelerate in step S312. The deceleration signal B3 has the same waveform as but in an inverse direction to that of the acceleration signal B3, and it is output when the momentum of the vibration isolation table 3 takes a maximum peak value B5 which is in an opposite direction

to the movement of the stage 4 as can be seen in
FIG. 6(F). Thus, the momentum of the stage 4 is
effectively canceled out by the stress created when the
stage 4 is decelerated, and the stage 4 is put into a
5 stop in step S313. In this case, as shown in
FIG. 6(D), the rolling of the vibration isolation table
3 can be suppressed effectively as compared to the
conventional case indicated by broken line, in which
the present invention is not employed.

10 According to the second embodiment, the rolling of
the vibration isolation table 3 can be suppressed
effectively when the stage 4 is moved using a joystick
or button as the input device 11.

Next, the third embodiment of the present
15 invention will now be described. The schematic
structure of the stage apparatus here is similar to
that of FIG. 1 and therefore this figure will be
referred to in the following explanation.

Here, the input device 11 is designed to input a
20 target movement speed of the stage 4 as input data, and
it is used to move the stage 4 at a constant speed.
More specifically, the input device 11 is used to move
the stage 4 over a long stroke at a constant speed for
the case where an object 5 to be tested on the stage 4
25 is to be observed and measured.

The operation of the stage apparatus having the
above-described structure will now be described with

reference to the flowchart shown in FIG. 7 as well as the waveforms regarding the stage 4 and the vibration isolation table 3 illustrated in FIGS. 8(A) to 8(F).

First, as a target movement speed for the stage 4 is input from the input device 11 in step S121, the control device 8 calculates the size (amplitude) of the acceleration signal of the stage 4 in step S221. This calculation is conducted in the same manner as in the first embodiment. More specifically, a speed which can be reached as the stage 4 is accelerated by a predetermined acceleration waveform is obtained in advance by calculation or actual measurement, and thus obtained value is stored as a reference value for calculation. The size of an acceleration waveform actually required can be calculated out by multiplying the [rate of the target movement speed with respect to the reached speed in a predetermined acceleration waveform] with the [size of a predetermined acceleration waveform]. Further, the target movement speed of the stage 4 in this case, is set to be obtained by accelerating two times by an acceleration signal having the same waveform, as shown in FIG. 8(A), and the size of the acceleration signal is set to be just necessary to accelerate the stage up to a half speed of the target movement speed.

From the above-described state, the control device 8 outputs the first acceleration signal C1 used to

accelerate the stage up to a half speed of the target movement speed in step S222, and then the stage 4 is accelerated to a half speed of the target movement speed in step S321 as shown in FIG. 8(B). Then,
5 (0.5 - n) × T seconds after the output of the first acceleration signal C1 in step S223, the control device 8 outputs a second acceleration signal C2 having the same waveform as that of the first acceleration signal C1 in step S224. With the second acceleration signal
10 C2, the stage 4 is further accelerated in step S322, and reaches the target movement speed. After that, in step S323, the stage 4 is moved at constant speed.

In this case, when the stage 4 is accelerated with the first acceleration signal C1, the vibration
15 isolation table 3 starts to roll due to the stress of the acceleration as shown in FIG. 8(C). Then, (n - 0.5) × T seconds (that is, in FIG. 8, 0.5T seconds later for n = 1) after the output of the first acceleration signal C1, a second acceleration signal C2
20 is output. The second acceleration signal C2 is output when the momentum of the vibration isolation table 3 takes a maximum peak value C3 which is in the same direction as that of the movement of the stage 4 as can be seen in FIG. 8(E). Thus, the momentum of the
25 vibration isolation table 3 is canceled out by the stress created due to the second acceleration signal C2, and therefore the rolling of the vibration

isolation table 3 can be suppressed effectively as compared to the conventional case indicated by a broken line, and in which the present invention is not employed, as can be seen in FIG. 8(C).

5 According to the third embodiment, the rolling of the vibration isolation table 3 can be suppressed effectively even in the case the stage 4 is moved at a constant speed as a target movement speed for the stage 4 is input from the input device 11.

10 Next, the fourth embodiment of the present invention will now be described. It should be noted here that the first to third embodiments were described above taking examples where the rolling oscillation period T of the vibration isolation table 3 is known.
15 However, according to the fourth embodiment, there is provided a stage apparatus which can adjust the rolling oscillation period T manually when the rolling oscillation period T of the vibration isolation table 3 is not known.

20 FIG. 9 is a diagram schematically showing a structure of the stage apparatus according to the fourth embodiment of the present invention. In FIG. 9, the same structural elements as shown in FIG. 1 or 11 are designated by the same reference numerals.

25 In FIG. 9, through an input device 21, a target movement amount of a stage 4 are input as input data, and then the input device outputs them to a control

device 22. As the input device 21, an arbitrary device having such a function that a target movement amount can be input and then it can be output to the control device 22, will do. Here, for example, a manual device
5 with which a target movement amount can be input, or a pre-programmed computer, can be used as the input device.

The control device 22, although it is not particularly limited, is made of, for example, a
10 computer and serves to control the driver of the servo motor, which is an acceleration/deceleration device 9. Further, the control device 22 handles a variable T_c which corresponds to the rolling oscillation period T of the vibration isolation stage 3, which can be
15 changed from outside.

An adjustment device 23 is connected to the control device 22. The adjustment device 23 serves to manually and arbitrarily change the variable T_c of the control device 22, which corresponds to the rolling
20 oscillation period T of the vibration isolation table 3, which is not known then. Further, a CCD camera 24 is provided for the microscope 7, and an observation image of an object to be tested, taken via the microscope 7 is picked up by the CCD camera 24, and
25 then displayed on a monitor 25.

In the stage apparatus having the above-described structure, as the stage 4 is driven based on the

variable T_c set in the control device 22, taken as the rolling oscillation period T of the vibration isolation stage 3, the vibration isolation stage 3 is rolled and oscillated as the stage 4 is driven. Accordingly, the oscillation is propagated to the microscope 7 from the stage 4 and therefore the observation image displayed on the monitor 25 is oscillated as well.

The observer, while monitoring the oscillation state of the observation image displayed on the monitor 25, is supposed to adjust the variable T_c set in the control device 22 to set the optimal variable T_c that can minimize the oscillation. Then, the control device 22 takes thus set viable T_c as the rolling oscillation period T of the vibration isolation table 3, and controls the stage 4 as in the first to third embodiments described above.

Here, the observer is supposed to adjust the variable T_c set in the control device 22 while monitoring the oscillation state of the observation image; however it is alternatively possible that a vibration meter, not shown, is provided for the vibration isolation table 3 and the variable is adjusted while monitoring the vibration waveform indicated by the vibration meter.

According to the fourth embodiment, even if the rolling oscillation period T of the vibration isolation table 3 is not known, it is still possible for the

observer to assign the optimal variable T_c adjusting the variable T_c set in the control device 22 while monitoring the oscillation of the microscopic observation image. Therefore, the rolling of the vibration isolation table 3 can be effectively suppressed.

Next, the fifth embodiment of the present invention will now be described. It should be noted here that the first to third embodiments were described above taking examples where the rolling oscillation period T of the vibration isolation table 3 is known, and the fourth embodiment was described by taking an example the rolling oscillation period T can be manually input still when the rolling oscillation period T is not known. However, according to the fifth embodiment, there is provided a stage apparatus which can adjust the rolling oscillation period T automatically when the rolling oscillation period T of the vibration isolation table 3 is not known.

FIG. 10 is a diagram schematically showing a structure of the stage apparatus according to the fifth embodiment of the present invention. In FIG. 10, the same structural elements as shown in FIG. 9 are designated by the same reference numerals.

In FIG. 10, through an input device 21, a target movement amount of a stage 4 is input as input data, and then the device outputs it to a control device 22.

As the input device 21, an arbitrary device having such a function that a target movement amount can be input and then it can be output to the control device 22, will do. Here, for example, a manual device with which
5 a target movement amount can be input, or a pre-programmed computer, can be used as the input device.

A vibration meter 31 is mounted on the vibration isolation table 3 which supports the stage 4. The vibration meter 31 serves to detect the rolling
10 oscillation of the vibration isolation table 3. In other words, the vibration meter 31 detects the rolling oscillation of the vibration isolation table 3, and outputs an oscillation signal to the control device 22.

The control device 22, although it is not
15 particularly limited, includes, for example, a computer and serves to control the driver of the servo motor, which is an acceleration/deceleration device 9. Further, the control device 22 handles a variable T_c which corresponds to the rolling oscillation period T
20 of the vibration isolation stage 3, which can be changed from outside. The variable T_c can be adjusted here with a signal equivalent to an oscillation amplitude detected by the vibration meter 31.

In the stage apparatus having the above-described
25 structure, as the stage 4 is driven based on the variable T_c set in the control device 22, taken as the rolling oscillation period T of the vibration isolation

stage 3, the vibration isolation stage 3 is rolled and oscillated as the stage 4 is driven, and the oscillation amplitude here is detected by the vibration meter 31. Then, the signal indicating the oscillation amplitude detected by the vibration detector 31 is
5 taken in the control device 22 from the vibration meter 31, the control device 22 revise the variable T_c . Then, while varying the variable T_c , the control device 22 takes in further oscillation amplitude signals to
10 find out such a variable T_c that the oscillation amplitude becomes minimum. Eventually, the control device 22 takes thus found viable T_c as the rolling oscillation period T of the vibration isolation table 3, and controls the stage 4 as in the first to third
15 embodiments described above.

According to the fifth embodiment, even if the rolling oscillation period T of the vibration isolation table 3 is not known, it is still possible to adjust the variable T_c set in the control device 22 to the
20 optimal variable T_c in accordance with the oscillation amplitude output from the vibration meter 31. Therefore, the rolling of the vibration isolation table 3 can be effectively suppressed.

It should be noted here that the present invention
25 is not limited to the above-described embodiments; but it can be realized in various modifications as long as the essence of the invention falls in its scope.

Industrial Applicability

As described above, according to the present invention, there is provided a stage apparatus which can effectively suppress rolling of the vibration isolation table, which is caused by a stress created as
5 the stage is accelerated or decelerated.

C L A I M S

1. A stage apparatus including a stage mounted on a vibration isolation table, comprising:

5 drive means for accelerating or decelerating said stage;

input means for accepting a target movement amount for said stage or a start signal of acceleration/ deceleration as input data; and

10 control means for outputting an acceleration signal to said drive means based on the input data to said input means and outputting, $n \times T$ seconds after said acceleration signal is output (where n represents a natural number and T represents a rolling oscillation period unique to the vibration isolation table [in
15 seconds]), a deceleration signal having a same waveform as that of said acceleration signal and an opposite direction thereto.

2. A stage apparatus according to claim 1,
20 wherein said input means is a joystick or a button switch.

3. A stage apparatus including a stage mounted on a vibration isolation table, comprising:

drive means for accelerating or decelerating said stage;

25 input means for accepting a target movement speed for said stage as input data; and

control means for outputting a first acceleration

signal to said drive means based on the input contents
to said input means and outputting, $(n-0.5) \times T$ seconds
after the first acceleration signal is output (where n
represents a natural number and T represents a rolling
5 oscillation period unique to the vibration isolation
table [in seconds]), a second acceleration signal
having a same waveform as that of the first
acceleration signal and a same direction thereto.

4. A stage apparatus according to any of claims 1
10 to 3, wherein said control means varies a variable T_c
equivalent to the rolling oscillation period T unique
to said vibration isolation table from outside, and
controls said drive means based on the variable T_c
taken as the rolling oscillation period T unique to
15 said vibration isolation table.

5. A stage apparatus according to claim 4,
further comprising: detection means for detecting the
rolling oscillation of said vibration isolation table,
wherein said control means adjusts the variable T_c
20 in accordance with the oscillation amplitude detected
by said detection means.