

CLAIMS

[Claim 1]

A semiconductor device examination method comprising:

5 a step of acquiring a first interference waveform based on signals from a plurality of drive elements according to light from a first spot comprising the plurality of drive elements in a semiconductor device; and

10 a step of separating a waveform signal for each of the drive elements from the first interference waveform based on operation timings of the plurality of drive elements,

wherein the step of separating a waveform signal for each of the drive elements comprising:

15 determining positions of the plurality of drive elements by analyzing the first interference waveform based on the operation timings of the plurality of drive elements and reproducing a wave height of the first interference waveform based on the operation timings of the plurality of drive elements from an estimated waveform signal for each of the drive elements; and

20 reconstructing the waveform signal for each of the drive elements based on the respective estimated waveform signal at the respective position.

[Claim 2]

25 The semiconductor device examination method according to claim 1, further comprising a step of arranging and displaying the waveform signal after separation and a reference waveform signal of the

semiconductor device or a waveform signal generated by a logic simulation.

[Claim 3]

5 The semiconductor device examination method according to claim 2, further comprising a step of comparing the waveform signal after separation with the reference waveform signal of the semiconductor device or the waveform signal generated by the logic simulation.

[Claim 4]

10 The semiconductor device examination method according to claim 3, further comprising a step of performing alignment between the semiconductor device and a layout image of the semiconductor device based on comparison results between the waveform signal after separation and the waveform signal generated by the logic simulation.

15 [Claim 5]

The semiconductor device examination method according to any one of claims 1 to 4, further comprising a step of identifying a position distribution of each of the drive elements in the first spot of the semiconductor device based on the waveform signal after separation,
20 and performing the alignment between the semiconductor device and the layout image of the semiconductor device based on the identified position distribution of each of the drive elements.

[Claim 6]

25 The semiconductor device examination method according to any one of claims 1 to 5, further comprising a step of performing noise removal filtering on the first interference waveform.

[Claim 7]

The semiconductor device examination method according to any one of claims 1 to 6, further comprising a step of acquiring a second interference waveform based on signals from the plurality of drive elements according to light from a second spot of which a region overlaps a part of the first spot and which comprises the plurality of drive elements, and

a step of separating a waveform signal for each of the driving elements in the first and second spots based on the first and second interference waveforms.

[Claim 8]

The semiconductor device examination method according to claim 7, further comprising a step of reconstructing a waveform signal at an arbitrary position in the first and second spots based on the first and second interference waveforms.

[Claim 9]

The semiconductor device examination method according to any one of claims 1 to 8, further comprising a step of irradiating the first spot with light, and

a step of detecting light from the first spot which is reflected light with respect to the light radiated to the first spot.

[Claim 10]

The semiconductor device examination method according to any one of claims 1 to 8, further comprising a step of detecting light from the first spot which is light emitted from the semiconductor device at the first spot.

[Claim 11]

A semiconductor device examination apparatus comprising:
a photodetector configured to detect light from a semiconductor device; and

5 an analysis part,

wherein the analysis part is configured to perform acquiring a first interference waveform in light detected by the photodetector based on signals from a plurality of drive elements according to light from a first spot comprising the plurality of drive elements in the semiconductor device, and separating a waveform signal for each of the drive elements from the first interference waveform based on operation timings of the plurality of drive elements,

wherein separating a waveform signal for each of the drive elements comprises:

15 determining positions of the plurality of drive elements by analyzing the first interference waveform based on the operation timings of the plurality of drive elements and reproducing a wave height of the first interference waveform based on the operation timings of the plurality of drive elements from an estimated waveform signal for each of the drive elements; and

20 reconstructing the waveform signal for each of the drive elements based on the respective estimated waveform signal at the respective position.

[Claim 12]

25 The semiconductor device examination apparatus according to claim 11, further comprising a display part configured to arrange and

display the waveform signal after separation and a reference waveform signal of the semiconductor device or a waveform signal generated by a logic simulation.

[Claim 13]

5 The semiconductor device examination apparatus according to claim 12, wherein the analysis part is configured to further perform comparing the waveform signal after separation with the reference waveform signal of the semiconductor device or the waveform signal generated by the logic simulation.

10 [Claim 14]

 The semiconductor device examination apparatus according to claim 13, wherein the analysis part is configured to further perform performing alignment between the semiconductor device and a layout image of the semiconductor device based on comparison results
15 between the waveform signal after separation and the waveform signal generated by the logic simulation.

[Claim 15]

 The semiconductor device examination apparatus according to any one of claims 11 to 14, wherein the analysis part is configured to
20 further perform identifying a position distribution of each of the drive elements in the first spot of the semiconductor device based on the waveform signal after separation, and performing the alignment between the semiconductor device and the layout image of the semiconductor device based on the identified position distribution of
25 each of the drive elements.

[Claim 16]

The semiconductor device examination apparatus according to any one of claims 11 to 15, wherein the analysis part is configured to further perform performing noise removal filtering on the first interference waveform.

5 [Claim 17]

The semiconductor device examination apparatus according to any one of claims 11 to 16, wherein the analysis part is configured to further perform acquiring a second interference waveform based on signals from the plurality of drive elements according to light from a second spot of which a region overlaps a part of the first spot and which comprises the plurality of drive elements, and separating a waveform signal for each of the driving elements in the first and second spots based on the first and second interference waveforms.

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[Claim 18]

The semiconductor device examination apparatus according to of claim 17, wherein the analysis part is configured to further perform reconstructing a waveform signal at an arbitrary position in the first and second spots based on the first and second interference waveforms.

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[Claim 19]

The semiconductor device examination apparatus according to any one of claims 11 to 18, further comprising a light generation part configured to generate light radiated to the first spot,

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wherein the photodetector detects light from the first spot which is reflected light with respect to the light radiated to the first spot.

25 [Claim 20]

The semiconductor device examination apparatus according to any one of claims 11 to 18, wherein the photodetector detects light from the first spot which is light emitted from the semiconductor device at the first spot.