CLAIMS

What is claimed is:

1. A detection device, characterized in that the detection device comprises:

a light generating and modulating apparatus used to generate a first polarized light and a second polarized light, so that the first polarized light is reflected by a surface to be detected of a component to be detected to form a first echo light, and the second polarized light is reflected by the surface to be detected of the component to be detected to form a second echo light, and the first echo light and the second echo light are interfered to form a signal light, wherein there is a preset shear amount between the centers of the first polarized light and the second polarized light; and

a first detection apparatus used to acquire first light intensity distribution information of the signal light, the first detection apparatus including two or more detectors which are all polarization detectors, and the polarization detection directions of different polarization detectors being different, or the two or more detectors including a non-polarization detector and at least one polarization detector,

wherein the first detection apparatus includes a first detection area used to scan the surface of the component to be detected; the first detection area including a plurality of first detection cell areas, and an arrangement direction of the plurality of first detection cell areas being not perpendicular to a scanning direction of the first detection area on the surface of the component to be detected, and the detectors are used to separately detect the signal light reflected back from the surface to be detected corresponding to the different first detection cell areas.

2. The detection device of claim 1, wherein the arrangement direction of the plurality of first detection cell areas is parallel to the scanning direction of the first detection area on the surface of the component to be detected.

3. The detection device of claim 1, wherein the first detection area is strip-shaped, and an extension direction of the first detection area is perpendicular to the scanning direction of the first detection area on the surface of the component to be detected.

4. The detection device of claim 3, wherein when the surface to be detected of the component to be detected is circular, the first detection area extends along a radial direction of the surface of the component to be detected; the scanning direction of the first detection area on the surface of the component to be detected being perpendicular to the diameter direction of the surface to be detected.

5. The detection device of claim 1, wherein the first polarized light and the second polarized light are used to form a detection spot on the surface of the component to be detected; in the scanning direction of the first detection area on the surface of the component to be detected, a size of the detection spot being greater than or equal to a size of the first detection area.

6. The detection device of claim 1, wherein each of the polarization detectors is a polarization line detector, and the non-polarization detector is a line detector.

7. The detection device of claim 1, wherein when the number of the polarization detectors is two, the polarization detection directions of the two polarization detectors are perpendicular to each other.

8. The detection device of claim 1, wherein when the first detection apparatus includes three or more polarization detectors including a first polarization detector, a second polarization detector, and a third polarization detector, wherein an angle between the polarization detection directions of the third polarization detector and the first polarization detector is equal to 360°/n, wherein n is an integer greater than or equal to 3 and n is the number of polarization detectors.

9. The detection device of claim 8, wherein the polarization detection directions of the first polarization detector and the third polarization detector are perpendicular to each other, and the angle between the polarization detection directions of the third polarization detector and the second polarization detector is 45°.

10. The detection device of claim 1, wherein when the first detection apparatus includes a non-polarization detector and at least one polarization detector, the number of the polarization

detectors is two or more, wherein an angle between the polarization detection directions of the two polarization detectors is acute or obtuse.

11. The detection device of claim 1, wherein the light generating and modulating apparatus comprise:

a first light generating means used to generate the first polarized light and the second polarized light, wherein there is a preset shear amount between the centers of the first polarized light and the second polarized light, and the first polarized light being reflected by the surface of the component to be detected to form the first echo light, the second polarized light being reflected by the surface of the component to be detected to form the second echo light, and the first and the second echo lights being combined;

a polarization controller used to modulate the polarization directions of the first echo light and the second echo light, so that the first echo light and the second echo light are interfered to form the signal light.

12. The detection device of claim 11, wherein the first light generating means comprises a detection light generating module and a beam adjusting module coupled with the detection light generating module, wherein:

the detection light generating module is used to generate a first detection light;

the beam adjustment module is used to divide the first detection light into the first polarized light and the second polarized light, and combine the first and the second echo lights.

13. The detection device of claim 12, wherein the detection light generating module comprises a first light source and a beam expanding shaping means, the first light source is used to generate the first detection light, and the beam expanding shaping means is used to control the shape and size of a spot on the surface of the component to be detected.

14. The detection device of claim 12, wherein the first detection light is linearly polarized light, circularly polarized light, or elliptically polarized light.

15. The detection device of claim 1, wherein the detection device further includes a first processing apparatus, wherein the first processing apparatus is used to acquire defect

information of the component to be detected according to the first light intensity distribution information of the signal light.

16. The detection device of claim 15, wherein the first processing apparatus includes:

a signal demodulation module used to acquire initial information of the signal light according to the first light intensity distribution information of the signal light;

a noise acquisition module used to perform low-pass filtering processing on the first light intensity distribution information of the signal light to acquire noise information;

a target information acquisition module used to acquire defect information of the component to be detected according to the initial information and the noise information.

17. The detection device of claim 16, wherein the initial information includes initial phase information of the signal light, and the noise information includes noise phase information,

wherein the target information acquisition module includes:

a target phase acquisition sub-module used to perform difference processing on the initial phase information and the noise phase information to obtain target phase information;

a defect information acquisition sub-module used to acquire defect information of the component to be detected according to the target phase information.

18. The detection device of claim 17, wherein the target information acquisition module further comprises: a defect standard library including preset phase information and preset defect information for determining a corresponding relationship between the preset phase information and the preset defect information; the defect information acquisition sub-module being specifically used to search in the defect standard library according to the target phase information to acquire corresponding preset defect information, and obtain the detect information of the component to be detected.

19. The detection device of claim 1, wherein the defect detection device further includes:

a second detection apparatus used to collect scattered light of the surface of the component to be detected, and acquire second light intensity distribution information of the scattered light;

a second processing apparatus used to acquire first defection information of the component to be detected according to the first light intensity distribution information, and acquire second defection information of the component to be detected according to the second light intensity distribution information, and acquire target defect information of the component to be detected based on the first defect information and the second defect information.

20. The detection device of claim 19, wherein further including:

a second light generating means used to generate a second detection light, and cause the second detection light to be scattered by the surface of the component to be detected to form the scattered light.

21. A detection method, wherein the detection method is applied to the defect detection device of any one of claims 1 to 20, the method comprising:

generating a first polarized light and a second polarized light by a light generating and modulating apparatus, and the first polarized light being reflected by a surface to be detected of a component to be detected to form a first echo light, the second polarized light being reflected by the surface to be detected to form a second echo light, wherein there is a preset shear amount between the centers of the first polarized light and the second polarized light;

causing the first echo light and the second echo light to interfere to form a signal light by the light generating and modulating apparatus;

acquiring light intensity information of the signal light along a plurality of different polarization directions by a first detection apparatus, or acquiring total light intensity information of the signal light and light intensity information along at least one polarization directionwherein when the first detection apparatus includes a first detection area, and the first detection area includes a plurality of first detection cell areas, the method further comprises:

controlling the first and the second polarized lights to scan the surface to be detected, and repeating steps of forming the signal light and acquiring the light intensity information,

wherein the scanning direction of the first polarized light and the second polarized light on the surface to be detected is the same as the arrangement direction of the plurality of first detection cell areas.

22. The detection method of claim 21, wherein the step of acquiring the first light intensity information includes: sampling the light intensity information of the signal light by the first detection apparatus, and during time interval of two adjacent sampling, the scanning distance of the first detection area being the scanning step length, and a distance between the centers of adjacent first detection cell areas being equal to an integer multiple of the scanning step.

23. The defect detection method of claim 22, wherein the distance between the centers of adjacent first detection cell areas is equal to the scanning step length.

24. The detection method of claim 21, wherein the step of controlling the scanning of the first polarized light and the second polarized light on the surface to be detected includes: controlling the surface to be detected of the component to be detected to move in a direction opposite to the scanning direction.

25. The detection method of claim 24, wherein the step of controlling the surface to be detected of the component to be detected to move in a direction opposite to the scanning direction includes: controlling the component to be detected to rotate around a rotation axis of the component to be detected;

the step of controlling the scanning of the first polarized light and the second polarized light on the surface of the component to be detected further includes: after the surface to be detected rotates around the rotation axis one cycle, or during the surface to be detected rotates around the rotation axis, controlling the spot formed by the first polarized light and the second polarized light on the component to be detected to move along a diameter direction of the component to be detected.

26. The detection method of claim 21, wherein when the light generating and modulating apparatus includes a first light source and a beam expanding shaping means, the step of generating the first polarized light and the second polarized light includes:

generating a first detection light by the first light source to form the first polarized light and second polarized light based on the first detection light;

adjusting the shape and the size of the spot on the surface to be detected of the component to be detected formed by the first polarized light and the second polarized light by

the beam expander and shaping means, so that in the scanning direction of the first detection area on the surface of the component to be detected, the size of the detection spot is greater than or equal to the size of the first detection area.

27. The detection method of claim 21, wherein light intensity information of the signal light along a plurality of different polarization directions acquired by the first detection apparatus, or total light intensity information of the signal light and a light intensity information along at least one polarization direction are used as a first light intensity distribution information of the signal light, and after acquiring the first light intensity distribution information, the method further comprises:

acquiring defect information of the component to be detected according to the first light intensity distribution information of the signal light.

28. The detection method of claim 26, wherein acquiring defect information of the component to be detected according to the first light intensity distribution information of the signal light includes:

acquiring initial information of the signal light according to the first light intensity distribution information;

performing low-pass filtering processing on the first light intensity distribution information to acquire noise information;

acquiring the defect information of the component to be detected according to the initial information and the noise information.

29. The detection method of claim 28, wherein the initial information includes initial phase information of the signal light, and the noise information includes a noise phase information,

acquiring first defect information of the component to be detected according to the initial information and the noise information includes:

performing difference processing on the initial phase information and the noise phase information to acquire a target phase information;

acquiring the defect information of the component to be detected according to the target phase information.

30. The detection method of claim 29, wherein the step of acquiring the defect information of the component to be detected according to the target phase information includes:

according to the target phase information, searching corresponding preset defect information in a pre-configured defect standard library to acquire first defect information of the surface of the component to be detected, wherein the defect standard library includes corresponding relationships between a plurality of preset phase information and corresponding preset defect information.