

Claims

1. Apparatus for inspecting a surface of an object, comprising:
a first light source operative to illuminate the object without producing a patterned
5 image onto the object;
a second light source operative to project a patterned image produced from a
first polarized light from the second light source onto the object, the first polarized light
being polarized in a first polarization direction;
a third light source operative to project the patterned image produced from a
10 second polarized light from the third light source onto the object, the second polarized
light being polarized in a second polarization direction which is different from the first
polarization direction; and
an imaging device operative to capture images of the surface of the object when
the object is illuminated separately by the first, second and third light sources
15 respectively for determining a profile of the surface of the object.
2. Apparatus as claimed in claim 1, further comprising a polarization beam splitter
configured to polarize light rays from the second light source in the first polarization
direction.
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3. Apparatus as claimed in claim 2, wherein the polarization beam splitter is
configured to polarize light rays from the third light source in the second polarization
direction.
- 25 4. Apparatus as claimed in claim 2 or claim 3, wherein the polarization beam splitter
comprises a polarization cube or prism.
5. Apparatus as claimed according to any one of the preceding claims, further
comprising at least one grating through which light rays from the second and third light
30 sources are passed for producing the patterned image.
6. Apparatus as claimed in claim 5, further comprising at least one birefringence
plate through which polarized light rays from the second and third light sources are
passed.

7. Apparatus as claimed in claim 5 or claim 6, wherein the at least one birefringence plate is positioned between the at least one grating and the object.

5 8. Apparatus as claimed in any one of claims 5 to 7, wherein the birefringence plate is operative to generate a different extent of shift in differently polarized light that is passed through it.

9. Apparatus as claimed in any one of claims 5 to 8, wherein the birefringence plate
10 comprises a Lithium Niobate crystal.

10. Apparatus as claimed according to any one of the preceding claims, wherein the first polarization direction is transverse to the second polarization direction.

15 11. Apparatus as claimed in claim 10, wherein the first polarized light and the second polarized light comprise s-waves or p-waves.

12. Apparatus as claimed according to any one of the preceding claims, further comprising a quarter-wave plate positioned over the object for changing linearly
20 polarized light to circularly polarized light to be projected onto the object.

13. Apparatus as claimed in claim 12, wherein the quarter-wave plate is configured to produce circularly polarized light in respect of the second polarized light which is in a reverse direction to circularly polarized light in respect of the first polarized light.

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14. Apparatus as claimed according to any one of the preceding claims, wherein the apparatus is configured such that the patterned image from the second polarized light exhibits a different extent of shift on the object as compared to the patterned image generated from the first polarized light.

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15. Apparatus as claimed according to any one of the preceding claims, further comprising a beam splitter plate positioned to polarize light rays from the second and third light sources in different directions, a first side of the beam splitter plate being coated to cause polarization of light rays from the second and third light sources.

16. Apparatus as claimed in claim 15, wherein a second side of the beam splitter plate opposite to the first side is coated to reflect light rays from the second and third light sources.

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17. Apparatus as claimed in claim 16, wherein a thickness of the beam splitter plate causes a shift in the patterned image from the second polarized light as compared to the patterned image generated from the first polarized light.

- 10 18. Method for inspecting a surface of an object, comprising the steps of:
illuminating the object with a first light source without producing a patterned image onto the object;
projecting a patterned image produced by a first polarized light from a second light source which is polarized in a first polarization direction onto the object;
15 projecting the patterned image produced by a second polarized light from a third light source which is polarized in a second polarization direction onto the object, the second polarization direction being different from the first polarization direction; and
capturing images of the surface of the object when the object is illuminated separately by the first, second and third light sources respectively with an imaging
20 device to determine a profile of the surface of the object.