CLAIMS

1. A shearography system comprising:

an optical imaging device; ~~and~~

an acoustic transducer comprising an opening configured to be aligned with a region of interest on a sample; and

a matching layer disposed between the acoustic transducer and the sample, the matching layer having an acoustic impedance matching the acoustic impedance of the acoustic transducer and the sample,

wherein the acoustic transducer is configured to apply acoustic loading on the sample based on one or more parameters; and

wherein the optical imaging device is configured to image the region of interest with and without the acoustic loading through the opening.

~~2. The shearography system as claimed in claim 1, further comprising a matching layer disposed between the acoustic transducer and the sample, the matching layer having an acoustic impedance matching the acoustic impedance of the acoustic transducer and the sample.~~

~~3~~2. The shearography system as claimed in claim ~~2~~1, wherein the matching layer comprises a pliant material configured to adapt to the shape of the acoustic transducer and the sample.

~~4~~3. The shearography system as claimed in ~~any one of~~ claim~~s~~ 1 ~~to~~ or ~~3~~2, wherein the acoustic transducer comprises a plurality of transducer elements, and wherein the transducer elements are independently controllable.

~~5~~4. The shearography system as claimed in claim ~~4~~3, wherein the transducer elements are configured to generate focused or directed acoustic waves in the region of interest.

~~6~~5. The shearography system as claimed in claim ~~4~~3, wherein the transducer elements are configured to generate rotational acoustic waves in the region of interest.

~~7~~6. The shearography system as claimed in ~~any one of~~ claim~~s~~ 1 ~~to~~ or ~~3~~2, wherein the acoustic transducer comprises a plurality of discrete transducer elements.

~~8~~7. The shearography system as claimed in any one of the preceding claims, wherein the acoustic transducer comprises a concave surface.

~~9. The shearography system as claimed in claim 1, wherein the acoustic transducer comprises an electromagnetic acoustic transducer (EMAT).~~

~~10~~8. The shearography system as claimed in any one of claims 1 to ~~8~~7, wherein the acoustic transducer comprises an air-coupled ultrasonic transducer.

~~11~~9. The shearography system as claimed in any one of the preceding claims, wherein the one or more parameters comprise resonant frequency of the acoustic transducer and/or defect resonant frequencies.

~~12~~10. The shearography system as claimed in any one of the preceding claims, wherein the one or more parameters comprise a depth into the sample, wherein the depth is controlled by focusing an acoustic wave at the region of interest.

~~13~~11. A shearography method comprising the steps of:

providing an optical imaging device and an acoustic transducer, the acoustic transducer comprising an opening configured to be aligned with a region of interest on a sample;

disposing a matching layer between the acoustic transducer and the sample, wherein the matching layer has an acoustic impedance matching the acoustic impedance of the acoustic transducer and the sample;

taking, by the optical imaging device, a reference first image of the region of interest while the acoustic transducer is not activated;

applying, by activating the acoustic transducer, acoustic loading on the sample based on one or more parameters;

taking, by the optical imaging device, a second image of the region of interest while the acoustic loading is applied; and

generating an output based on an analysis of the reference first image and second image.

~~14. The shearography method as claimed in claim 13, further comprising the step of disposing a matching layer between the acoustic transducer and the sample, wherein the matching layer has an acoustic impedance matching the acoustic impedance of the acoustic transducer and the sample.~~

~~15~~12. The shearography method as claimed in claim ~~14~~11, wherein the matching layer comprises a pliant material, and wherein disposing the matching layer comprises adapting the matching layer to the shape of the transducer and the sample.

~~16~~13. The shearography method as claimed in any one of claims ~~13–~~11 to ~~15~~12, wherein the acoustic transducer comprises a plurality of transducer elements, and wherein applying the acoustic loading on the sample comprises independently controlling the plurality of the transducer elements.

~~17~~14. The shearography method as claimed in claim ~~16~~13, wherein applying the acoustic loading on the sample comprises generating focused or directed acoustic waves in the region of interest.

~~18~~15. The shearography method as claimed in claim ~~16~~13, wherein applying the acoustic loading on the sample comprises generating rotational acoustic waves in the region of interest.

~~19~~16. The shearography method as claimed in any one of claims ~~13–~~11 to ~~15~~12, wherein the acoustic transducer comprises a plurality of discrete transducer elements.

~~20~~17. The shearography method as claimed in any one of claims ~~13–~~11 to ~~19~~16, wherein the acoustic transducer comprises a concave surface.

~~21. The shearography method as claimed in claim 13, wherein the acoustic transducer comprises an electromagnetic acoustic transducer (EMAT).~~

~~22~~18. The shearography method as claimed in any one of claims ~~13–~~11 to ~~20~~17, wherein the acoustic transducer comprises an air-coupled ultrasonic transducer.

~~23~~19. The shearography method as claimed in any one of claims ~~13–~~11 to ~~22~~18, wherein applying the acoustic loading on the sample based on one or more parameters comprises selecting resonant frequency of the acoustic transducer and/or defect resonant frequencies.

~~24~~20. The shearography method as claimed in any one of claims ~~13–~~11 to ~~23~~19, wherein applying the acoustic loading on the sample based on one or more parameters comprises selecting a depth into the sample, wherein the depth is controlled by focusing an acoustic wave at the region of interest.