Materials Testing:

3D Optical Strain and Displacement Measurement System

Background

Material testing meets many needs of the structural mechanics community. Notable among them are material properties characterization, engineering design qualification, and functional tailoring of advanced materials such as polymer matrix and nano-composites.

An essential component of material testing is the ability to measure strain and displacement fields in a material under loading conditions. However, taking such measurements using tools such as resistive strain gauges and mechanical extensometers can be arduous.

Digital imaging methods hold great promise for simplifying measurement, while increasing accuracy and analysis capability. They combine digital cameras with software algorithms, which respectively record and process images of the specimen. Beginning in the 1980s, such methods have been used to measure strain and displacement.

Applications

- Materials testing
- Material Characterization
- Structural qualification and certification
- Tailoring of advanced materials

Challenges

Digital imaging *is indeed* the future of strain metrology. A challenge is making it easy to use. Current methods, such as regular grid and digital image correlation (DIC), are difficult to use and require the user to possess experience with the specialized methods of applying optical targets to the surface of the material. Results obtained using DIC are highly sensitive to the application method, lighting conditions, and on the specimen surface.

The Point Semantics Product

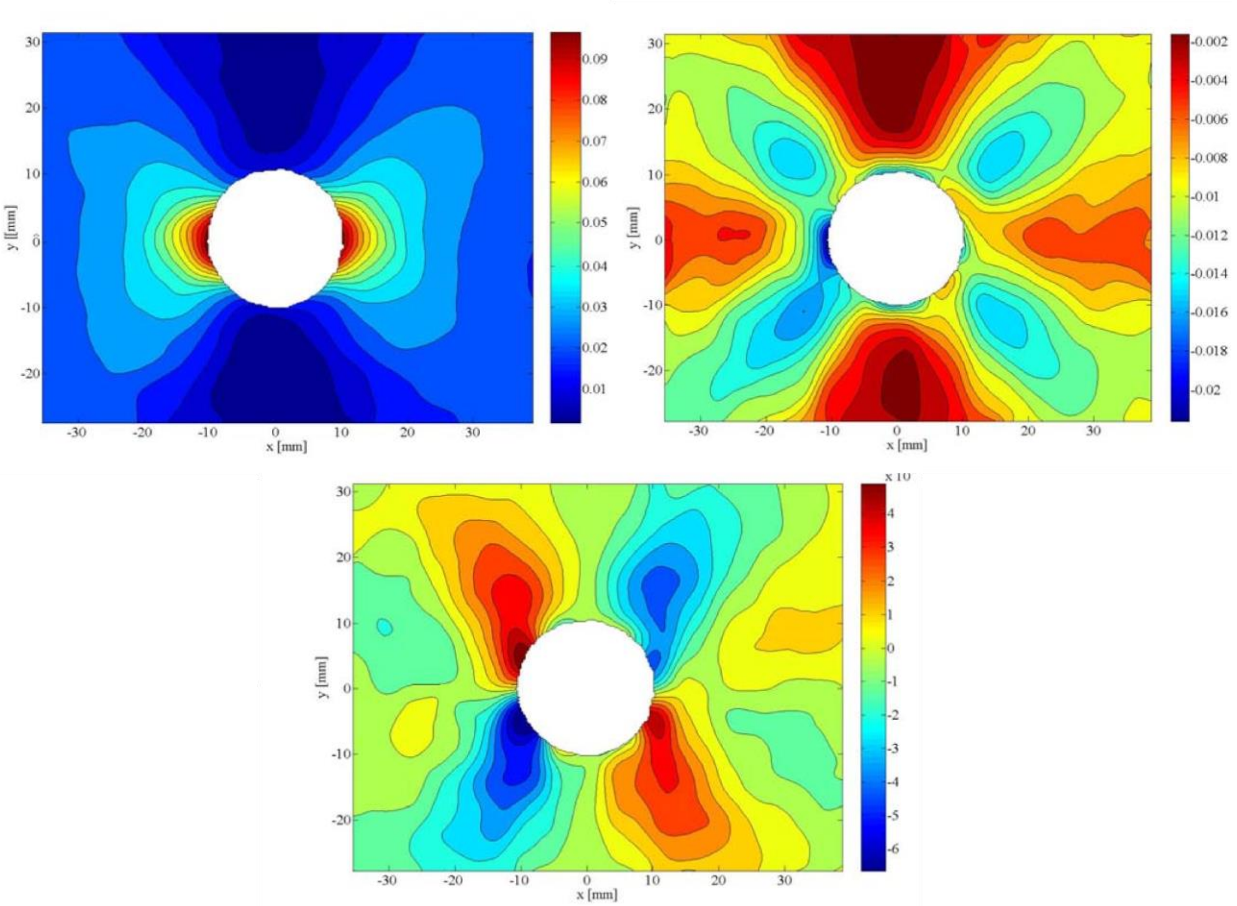
Point Semantics is building the next generation 3D optical strain measurement system that addresses these challenges. It will include easily applied targets (marks or dots), easily set up cameras, and compute nodes implementing Point Semantics' proprietary mesh free random grid and direct strain imaging methods to provide local and full-field measurements.

The technology originated in the U.S. Navy, having been developed to test and characterize high performance carbon-epoxy composites for various fighter jet applications. It will change the way industry designs, tests, and qualifies structural systems. It will save structural mechanics practitioners many hours and yield more sensitive, more accurate, and more efficient results than any predecessor method.

Point Semantics technology advantages over DIC:

- **Simpler to use**: PSC's marks or dots are easier to apply; users can apply them in an approximate grid pattern. This will save preparation time.
- **Five times more precise**: DIC and other digital imaging systems have a precision point error at the level of +/-200 microStrains. PSC technology has a precision point error of +/-40 microStrains.
- **More accurate where DIC has difficulty**: PSC's full-field product will measure strain fields near edges, holes, and at welds and junctions. DIC falters at such locations.
- **300 times faster processing speed**: PSC's technology operates in real time (30 frames per second) on a regular laptop computer. Its efficiency makes it available on very low energy and embedded microcontroller systems.
- **Sixteen times higher image resolution**: PSC's technology has been demonstrated to work in real time on very large images (40MPixels+). DIC methods become extremely slow at such resolutions.

Strain tensor field distributions via Point Semantics' technology



You can request more information, pre-order the product, or request testing services now by emailing us at info@pointsemantics.com.