

Study of Natural Patterns on Digital Image Correlation Using Simulation Method

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Abstract : Digital image correlation (DIC) is a contactless full-field displacement and strain reconstruction technique commonly used in the field of experimental mechanics. Comparing with physical measuring devices, such as strain gauges, which only provide very restricted coverage and are expensive to deploy widely, the DIC technique provides the result with full-field coverage and relative high accuracy using an inexpensive and simple experimental setup. It is very important to study the natural patterns effect on the DIC technique because the preparation of the artificial patterns is time consuming and hectic process. The objective of this research is to study the effect of using images having natural pattern on the performance of DIC. A systematical simulation method is used to build simulated deformed images used in DIC. A parameter (subset size) used in DIC can have an effect on the processing and accuracy of DIC and even cause DIC to failure. Regarding to the picture parameters (correlation coefficient), the higher similarity of two subset can lead the DIC process to fail and make the result more inaccurate. The pictures with good and bad quality for DIC methods have been presented and more importantly, it is a systematic way to evaluate the quality of the picture with natural patterns before they install the measurement devices.

Keywords : Digital Image Correlation (DIC), deformation simulation, natural pattern, subset size

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