

High Temperature and High Speed Digital Image Correlation Method for Dynamical Measurement of Thermal Shock

Xue Feng *, Xiang Wang, Guobing Zhang, Huimin Xie, Helong Yu

Summary

Most ceramic materials, because of their inherent brittleness, are susceptible to catastrophic failure under conditions of thermal shock. A novel method for measuring the dynamical deformation is proposed by using of high speed digital image correlation in high temperature environment. The nature texture of ceramic materials can be used as speckle while filters and monochrome produced by LED are applied to suppress black-body radiation and enhance the luminous intensity.

The light from the heated material can alter the Grayscale of material surface and the recognition for material surface will become more and more difficult with the temperature increase. In order to eliminate the affect of light radiation from high temperature object, an optical filter system is fixed on the lens. This optical filter can cut off almost all light except for the concerned light whose wavelength works for the range of filter and can almost filter the radiation from long wave band at hundreds of degrees Celsius. In our research, we success to conduct the thermal shock measurement with the high speed camera with 5000fps in the environment with the temperature of 1500C.

