

CFRPs have high specific strength and specific stiffness and are mainly used as lightweight structural material. Nondestructive inspections are mainly used to check pores and cracks in CFRPs that occurred processing. Among them, the IR image inspection has an advantage that the internal defect of the composite can be confirmed without damaging the specimen. In this study, the ball drop impact test was performed on the carbon composite material with lamination angles, and the internal damage of the specimens after impact was analyzed by the lock-in thermography method.

An infrared thermal image refers to the converted image through the detecting the radiant energy on the surface of the object by a thermal imaging camera and then convert that energy into temperature for visually confirmation.

The test specimens used in the experiments were formed into woven prepreg, and the molded specimens were subjected to a ball drop impact test according to ASTM D7136. After the test, the lock-in thermography analysis was carried out to check the internal damage of the specimens. All cracks propagated from the impact part to the fiber direction and could be confirmed through the thermal image. The process of failure was confirmed by thermal imaging camera, and the failure factors such as fiber failure and peeling were confirmed through lock-in thermography. The result, both the thermal image and the images acquired through the lock-in non-destructive inspection confirmed the failure modes according to the fiber angle, and the lock-in images confirmed the presence of the fiber breakage and delamination.