Optimizations of Defects in Carbon Fiber Reinforced Plastics Using Heat Conduction Analyses

***M. Muramatsu[1], S. Nakasumi[1], Y. Harada[1], and T. Suzuki[1]**

[1] Advanced Manufacturing Research Institute,
National Institute of Advanced Industrial Science and Technology,
1-2-1 Namiki, Tsukuba, Ibaraki 305-8564, Japan.

*Corresponding author: mayu-muramatsu@aist.go.jp

Recently, carbon fiber reinforced plastics (CFRPs) are attracting increasing attentions as structural materials. With increase in use of CFRPs in industry, Non-destructive tesing (NDT) is necessary to keep the health of the structures. One of the NDT for CFRP laminates is infrared thermography, in which defects are detected by obtaining temperature distributions on surfaces by infrared thermocamera. In this study, optimizations are conducted to evaluate the shapes of defects in two kinds of CFRP laminates. 0/90 CFRP laminates with PAN-based and pitch-based carbon fibers which are oriented toward the direction of 0º and 90º alternately are employed as the computational models. The thermophysical properties are different between the CFRP laminates with PAN-based and pitch-based carbon fibers and are calculated based on the mixture laws. The optimizations of shapes of defects are conducted, and the accuracies of the analyses are discussed.

Keywords: Carbon fiber reinforced plastic, Optimization, Heat conduction, Detection of defects