Abstract

This paper details the development of an on-wing NDE system for detecting stress corrosion cracks. These cracks are three-dimensional defects with many facets at different orientations. They can grow quickly and cause catastrophic failure, so it is imperative to be able to reliably inspect for them in the aerospace industry. However, it is very difficult to detect them using a single ultrasonic transducer, due to the fact that the crack facets are oriented at unpredictable angles. Therefore an array is being developed because arrays can be used to inspect and image at many angles, and offer higher inspection speed and reliability. The development of the array involves simulating the ultrasonic response from complex defects, on which little research has been carried out so far. In this paper, models for simulating the ultrasonic response from complex real defects are developed. Different procedures to obtain three-dimensional images of real stress corrosion cracks are presented and compared. These images are inputted into the computer models and simulations run. In order to validate the models, novel manufacturing techniques are being investigated which can be used to make test blocks containing complex artificial defects. The results of this work are also presented.