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Improved Micro-CT of SiC/SiC Ceramic Matrix Composites

Ceramic matrix composites composed of silicon carbide fibres in a silicon carbide matrix (SiC/SiC) are being introduced into gas turbine engines. Their introduction will increase engine thrust by allowing high operating temperatures and also reduce weight. Unlike monolithic ceramics they are effectively tough with elastic energy being consumed in fibre pull-out during crack propagation. However, much work still needs to be done before these materials are fully understood. The authors have been mapping the crack propagation in SiC/SiC using micro-CT and in-situ mechanical loading. Bright synchrotron X-ray sources were used to provide the intensity to map the crack propagation in practical times. One run was performed using the IMBL using 25 keV X-rays, and a second using the powder diffraction beam line at 15 keV. The first run showed fibre pull-out but failed to resolve the effects of the fibre coatings. The use of 15 keV improved the image quality and enabled fibre coatings to be resolved. The poster will compare the two experimental set-ups and the two sets of images and discuss what factors contributed to the improvement in image quality. Ideas for further improvements will also be presented.

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