POSTER EXPOSITION

MANCHESTER 1824
The University of Manchester

Poster 11

Understanding of ductile fracture mechanisms in nuclear pressure vessel steels under different constraints

Suleyman Karabal

AUTHOR OF POSTER:
Suleyman Karabal

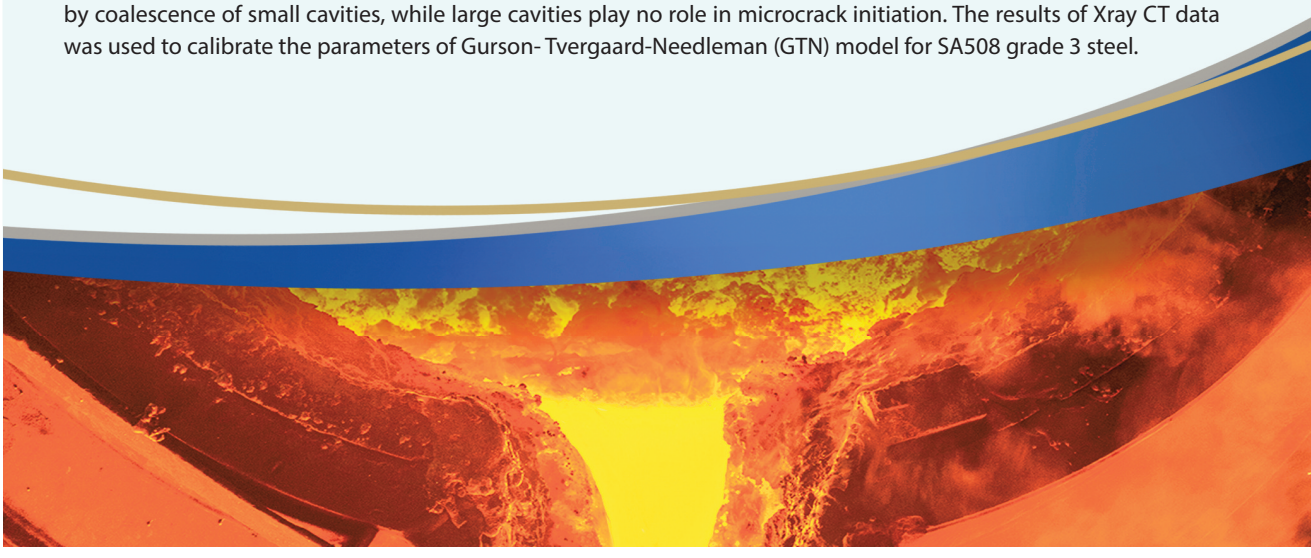
INSTITUTION:
The University of Manchester

OTHER AUTHORS:
Professor Philip Withers, The University of Manchester
Dr Tim Burnett, The University of Manchester
Professor Andrew Sherry, The University of Manchester

ABSTRACT:
Specimens of SA508 grade 3 steel with different notch geometries have been subjected to tensile straining while simultaneously imaged using high-resolution, in-situ synchrotron computed tomography.

Site-specific post-mortem metallographic sectioning analysis was performed using scanning electron microscope. These methods are used for the direct observation of ductile fracture mechanisms, namely void nucleation, growth and coalescence.

It was found that the interfacial strength between inclusions and matrix material is zero, therefore inclusions nucleate cavities at zero plastic strain. Conversely, sub-micron carbides require larger strain and high triaxial stress to nucleate cavities, which are concentrated within 350 μm of the necked region. Interestingly, internal microcracks are formed by coalescence of small cavities, while large cavities play no role in microcrack initiation. The results of Xray CT data was used to calibrate the parameters of Gurson- Tvergaard-Needleman (GTN) model for SA508 grade 3 steel.



Organised by:

Materials Processing Institute

ARMOURERS & BRASIERS' COMPANY

I·M3

Associate Sponsor:

M2A COATED www.M2A.wales

PRISM