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ONLINE ISSN : 1881-1760

PRINT ISSN : 1880-3717

Journal of the Japan Society of Naval Architects and Ocean Engineers

Vol. 7 (2008) pp.251-258

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Influence of Weld Heat Input and Texture of Base Metal on Brittle Crack Propagation Behavior along Welded Joint -Numerical Simulation of Brittle Crack Propagation along Welded Joint (2nd Report) -

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(Accepted February 25, 2008)

Summary: In the previous paper, influence of applied stress, residual stress and toughness of welded joint on brittle crack propagation was analyzed based on a fracture mechanics model developed by the authors. This model assumes that a crack propagates along the cleavage plane with the highest tensile normal stress among the cleavage planes. Results of numerical simulation were compared with the experimental results which were carried out in the SR 147 research committee of the Shipbuilding Research Association of Japan, and it was shown that the model used could explain the experimental results. In this paper, influence of weld heat input and texture of base metal on brittle crack propagation behavior along welded joint is analyzed using the above mentioned model. Weld heat input involves influence of residual stress (small or large) and toughness of welded joint (welded joint is divided into weld metal, CGHAZ and other HAZ, and toughness of each zone is assumed to be different). Texture of base metal is reflected by normal distribution, and by random for comparison. It is concluded that crack propagation path is dependent very much on weld heat input, but is not dependent on texture of base metal when a crack propagates in welded joint.

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Hitoshi Yoshinari and Shuji Aihara: Influence of Weld Heat Input and Texture of Base Metal on Brittle Crack Propagation Behavior along Welded Joint : -Numerical Simulation of Brittle Crack Propagation along Welded Joint (2nd Report) - , Journal of the Japan Society of Naval Architects and Ocean Engineers, (2008), Vol. 7, pp.251-258 .

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