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Experimental and finite element simulation

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Fatigue life of a dissimilar welded joint considering the weld residual stress:**Experimental and finite element simulation**Weiya Zhang^a, Wenchun Jiang^{a*}, Xu Zhao^b, Shan-Tuang Tu^c

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Abstract

This paper investigated the fatigue life of a dissimilar welded joint between SAF2205 duplex stainless steel and 304 austenite stainless steel. A nonlinear fatigue damage model based on continuum damage mechanics (CDM) is used to estimate the fatigue life, and the effect of the residual stress is studied. The results show that large residual stresses were generated in the dissimilar welded joint and agree well with the indentation measurement results. The fatigue test specimens were cut from the welded sample, and the residual stress relaxed significantly after longitudinal cutting, especially for longitudinal residual stress. Considering the transverse residual stress, the estimated fatigue life is more consistent with the experiment. The residual stress mainly affects the mean stress, rather than the stress amplitude. As the longitudinal residual stress relaxed significantly after cutting, the effect of welding residual stress on fatigue life can be seriously overestimated. The width of fatigue test specimen should be at least 30% of the as-weld sample for fatigue design in consideration of the

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