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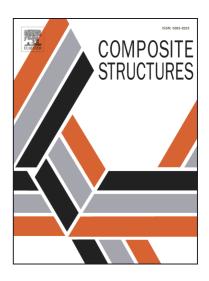
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ACCEPTED MANUSCRIPT

Effect of Single Tensile Peak Overload on the Performance of Bonded Composite Repair of

Cracked Al 2024-T3 and Al 7075-T6 Plates

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Abstract

Under real working conditions, structures are subjected to variable and peak loads. It is well

known that cracks growth rate is load history dependent. Overloads generate crack growth

retardation while underloads produce acceleration in crack growth. The effect of load history on

patch repair is not covered so far. In this work, we investigated experimentally, how a single

overload peak affects the performance of a bonded composite patch repair in cracked Al 2024-T3

and 7075-T6 samples fatigued under a cyclic loading. We studied the effect of three overload

peaks; 9, 12 and 14 kN, applied just before and soon after the bonded composite repair. The

fatigue lives and retardation cycle numbers exhibited that subjecting the test sample to overload

before the repair will cause more retardation of the crack growth, while the reverse will result in

less retardation, yet still better than that subjected to an overload alone. We carried out SEM

observations to analyse the fractographs of failed specimens subjected to overloads and observed

mixed mode fracture type.

Keywords: Bonded composite patch; Crack repair; Overload; Retardation.

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