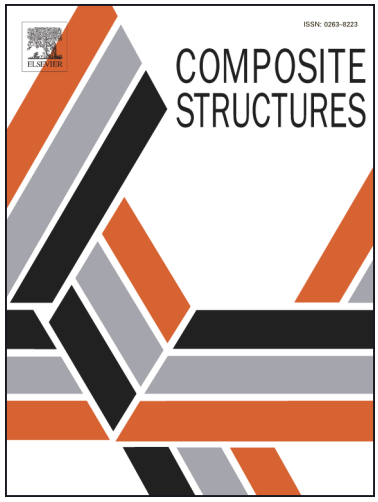

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PII: S0263-8223(18)31342-4
DOI: https://doi.org/10.1016/j.compstruct.2018.08.046
Reference: COST 10096

To appear in: *Composite Structures*

Received Date: 11 April 2018
Revised Date: 5 July 2018
Accepted Date: 17 August 2018

Please cite this article as: Razavi, S.M.J., Ayatollahi, M.R., Majidi, H.R., Berto, F., A strain-based criterion for failure load prediction of steel/CFRP double strap joints, *Composite Structures* (2018), doi: https://doi.org/10.1016/j.compstruct.2018.08.046

A strain-based criterion for failure load prediction of steel/CFRP double strap joints

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Abstract

One of the most effective approaches to improve the strength of steel structures is using the carbon fiber reinforced polymer (CFRP) as externally-bonded sheets. In this paper, a strain-based failure criterion, namely the critical normal strain (CNS) is employed to predict the failure load of adhesively bonded double strap joints which are made of CFRP and steel plates. According to this approach, the adhesive joint fails when the normal strain along the adhesive mid-line attains a critical value at a critical distance. This work is based on a two-dimensional linear elastic finite element analysis. Failure load capacities are estimated theoretically for steel/CFRP double strap joints with different bonding lengths. The predicted values of failure loads are compared with the experimental data reported in literature. It is shown that a good consistency exists between the experimental failure loads and the theoretical predictions based on the new strain-based criterion.

Keywords:

Adhesive joint; CFRP; Failure load prediction; Double strap joint; Steel structure.

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