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Enhancing repair of cracked plate using fiber-reinforced composite patch: Experimental and simulation analysis (2025) *Forces in Mechanics*, 18, art. no. 100302, .

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Abstract

In this study, a fiber-reinforced composite patch was bonded to one side of a cracked aluminum plate using Araldite-2014 adhesive. Experimental tensile tests were conducted on both repaired and unrepaired plates, with further analysis of the effects of patch material and dimensions performed using ANSYS simulations. The effectiveness of the patch repair was evaluated through the stress intensity factor (SIF), as obtained from both experimental and finite element methods. To optimize patch parameters—such as material, thickness, width, and height design of experiments (DOE) approach was applied. Results indicate that the use of fiber-reinforced composite patches is an effective technique for repairing cracked aluminum structures, as it significantly reduces SIF. The findings suggest that repair efficiency can be further enhanced by carefully considering key factors such as patch dimensions, adhesive thickness, and crack length. © 2024 The Author(s)

Author Keywords

Aluminium plate; And repair method; Composite patch; Numerical simulation; Stress intensity factor

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