# EXPERIMENTAL STUDY ON CRACKED STEEL PLATES WITH DIFFERENT DAMAGE LEVELS STRENGTHENED BY CFRP LAMINATES

By

**Mohamed Ahmed Shafiq**

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
**MASTER OF SCIENCE**
in
**Structural Engineering**

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
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Approved by the
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FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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**Title of Thesis:**

**Experimental Study on Cracked Steel Plates with Different Damage Levels Strengthened by CFRP Laminates**


**Key Words:**
Carbon Fiber Reinforced Polymer Laminates, Fatigue, Repaired Fatigue cracks, Repaired steel plates



**Summary:**

Strengthening steel structure using Carbon Fiber Reinforced Polymer (CFRP) Laminates has attracted attention in recent years owing to their potential for fatigue crack repair. However, little is known about the efficiency of this strengthening technique when applied to steel plates with different levels of damage. Available studies focused on efficiency of this strengthening technique under cyclic normal stresses. In this study, fatigue behavior of cracked steel plates strengthened by CFRP laminates is experimentally investigated. Different parameters are considered including damage level and strengthening theme. The study included 12 test units, divided into 3 groups, representing a single edge-notch specimen. Specimens were tested under eccentric axial fatigue cyclic loading till failure. The study lists the details of testing including: Material identification; Configuration of cracked steel Specimens; Applied load history and frequency; Adhesive Type; CFRP patch geometries (strip length/width); and Strengthening schemes (single/double-sided repair).

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