



Cairo University

**SEISMIC BEHAVIOR AND REPAIR OF STEEL FIBER  
REINFORCED CONCRETE BRIDGE COLUMNS**

By

**ABDEL-RAHMAN MOHAMED NAGUIB ABDEL-RAHMAN**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**DOCTOR OF PHILOSOPHY**  
in  
**STRUCTURAL ENGINEERING**

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**GIZA, EGYPT**

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**Title of Thesis:**

**“SEISMIC BEHAVIOR AND REPAIR OF STEEL FIBER  
REINFORCED CONCRETE BRIDGE COLUMNS”**

**Key Words:**

(Steel fibers; Hysteretic behavior; Bridge columns; Ductility; Quasi-static tests; Seismic demands; Repair; Carbon fibers)

**Summary:**

The study explores the efficiency of using steel fiber reinforced concrete (SFRC) in bridge columns which resisting earthquakes. This was achieved by investigating the hysteretic behavior of scaled bridge columns via quasi-static tests of repeated lateral loads in presence of axial compressive force. Curves for estimating some seismic demands were constructed when using SFRC in bridge columns. The repair of seismic damage was studied on some of the previously tested samples using carbon fibers. Results showed the benefit of using steel fibers in reinforced concrete.

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