Ain Shams University
Faculty of Engineering
Structural Engineering Department

Rehabilitation of RC Beams Using Vacuum Assisted Resin Transfer Molding

By
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B.Sc. Civil Engineering
Ain Shams University, 2003

A Thesis
Submitted in Partial Fulfillment for Requirements of the Degree of
Master of Science in Structural Engineering.

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STATEMENT

This thesis is submitted to Ain Shams University, Cairo, Egypt, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering (Structural).

The work included in this thesis was carried out by the author at reinforced Properties and Testing of Materials laboratory of the faculty of engineering, Ain Shams University.

No part of this thesis has been submitted for a degree or qualification at any other university or institute.

Date : 19 / 09 / 2009

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Rehabilitation of RC Beams Using Vacuum Assisted Resin Transfer Molding.

Master of Science, 2009
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ABSTRACT

The retrofitting and rehabilitation of concrete members using externally bonded Fibre Reinforced Plastics (FRP) is becoming an increasingly popular retrofit technique worldwide. The new Vacuum Assisted Resin Transfer Molding (VARTM) process was studied locally in Egypt in strengthening and repairing of RC elements, and was proved that the VARTM process is applicable domestically using local available materials, equipments, and workmanship. The research work carried herein will focus on the application of VARTM process in retrofitting and rehabilitations of RC beams subjected to various stress levels, to simulate the strengthening and repair of RC elements on site that will always take place under loading.

The research work focuses on studying the structural behaviour of the retrofitted RC T-beams under loading using locally available GFRP wraps using VARTM process.

The research work is carried out to study the structural behaviour of retrofitted RC T-beams using VARTM process in both flexural and flexural shear modes of failure.

The research work focuses on using VARTM process to inject cracked concrete under application of load, and studying the structural behaviour of the injected RC T-beams. The VARTM process is used to inject both flexure and flexural shear cracks. A brief literature was carried out for review of previous research work that dealt with retrofitting concrete elements using carbon or glass composites.

An experimental program is designed to study the structural behaviour of retrofitted RC T-beams using VARTM process under no load. Then to study the structural behaviour of retrofitted RC T-beams using VARTM process under different stress levels. Then to study the effect of injecting flexure and flexure shear cracks using VARTM process.

The experimental work reported herein demonstrated the retrofitting of RC beams using locally available GFRP wraps by the application of VARTM process proved to be an easy and reliable retrofitting technique. Retrofitting RC beams using externally bonded GFRP wraps had increased the ultimate load carrying capacity and had improved the stiffness.

Keywords: RC T-beam, GFRP, VARTM, Retrofitting, under loading.

TABLE OF CONTENTS

CHAPTER (6) : Experimental Result

LIST OF TABLES

LIST OF FIGURES