شبكة المعلومات الجامعية

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بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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HANAA ALY

AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Structural Engineering

Retrofitting of Unreinforced Masonry walls Using Basalt Textile Reinforced Mortar

A Thesis submitted in partial fulfillment of the requirements of the degree of

Master of Science In Civil Engineering

(Structural Engineering)

By

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Bachelor of Science In Civil Engineering

(Structural Engineering)

Faculty of Engineering, Ain Shams University, 2017

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STATEMENT

This thesis is submitted as a partial fulfilment of Master of Science in Civil Engineering Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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ABSTRACT

Unreinforced masonry (URM) structures constitute the largest part of the current worldwide buildings. The need for retrofitting of these structures is urgent due to the poor seismic performance under moderate and high seismic demand. Many techniques have been developed to retrofit the URM structures. The research Basalt textile reinforced mortar (BTRM) has drawn attention as an innovative retrofitting composite, due to its superior characteristics including simplicity, high performance at high temperatures in addition to low cost, in comparison to fiber reinforced polymer (FRP). Textile reinforced mortar (TRM) is a cement-based composite material that consists of high-strength fibers (i.e., carbon, glass, or basalt) in the form of textiles combined with inorganic matrices, such as cement-based mortars. Thus, BTRM represents new suitable technique for out of plane retrofitting for URM walls. This study aims to investigate the out of plane behavior of URM walls retrofitted by using BTRM and to assess the effectiveness of this retrofitting technique on the out-of-plane performance. The experimental program is divided into two Phases. The first phase is designed to study the material characterization used in the investigation. A tension test was conducted on BTRM coupon specimens to identify its mechanical properties in tension. While the second phase was designed to investigate the behavior of URM retrofitted by BTRM. Two Groups of fourteen URM wall specimens were constructed in vertical and horizontal spanning scheme. Parameters under study for both groups include wall thickness (single and double wythe), mesh opening size (5×5mm and 10×10mm), number of reinforcing layers (two and four layers) and retrofitting scheme (one side or both sides). The test results demonstrated the efficiency of (BTRM) as a retrofitting technique for URM walls. Out of plane flexural capacity remarkably increased by 188% to 400% compared to control samples. In addition, energy absorption increased 22 to 66 times. A proposal to

modify ACI model has been introduced to be more reliable for flexural capacity prediction of retrofitted URM walls.

Keywords: Unreinforced Masonry, Out-of-plane, Basalt textiles, Basalt textile reinforced mortar, BTRM, Retrofitting.

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