Dynamic Analysis of Applied CFRP in Retrofitting Process of SDH TV Masonry Building

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ABSTRACT

Masonry and historical structures from view of building importance have special position. Most of these buildings include particular architecture on a certain age which seismic retrofitting and restoration of them is very important issue. Different researches via laboratory and numerical methods for rapid assessment and numerical analysis of mentioned buildings were used. In this way, different kind of retrofitting such as supplementary concrete with mesh, method of steady frame and resistant mortar method have been evaluated. Analysis accuracy of these structures depends on materials properties, age and environment conditions and also type of fracture mechanism. In this paper, SDH TV masonry building of as a case study has been selected for retrofitting via CFRP laminates. Different elements have been used for analyzing of CFRP in ABAQUS software. Analysis results show that using mentioned fibres in various points of structure have been reduced all of tension and compressive stresses of excessive in masonry elements up to allowable range.

Key Words: Retrofitting, Masonry building, CFRP

1 INTRODUCTION

In recent years, fibre reinforced polymers (FRP) have been commonly used in the forms of rods and laminates, in order to strengthen and repair concrete and masonry buildings. These composite materials are often formed with saturating carbon (CFRP), glass (GFRP) or aramid fibres (AFRP) embedded in a polymeric matrix. Compared to other building materials, FRP provides several advantages; such as, possessing high tensile strength, low specific mass, high resistance to corrosion, and the ease of application. For reasons of economy and mechanics, these composites are often applied in narrow strips rather than full-width laminates [1]. The strategies adopted in the field of FRP application result in an increase of strength, ductility or both. Significant improvements in the strength and ductility capacity of reinforced concrete columns can be achieved by wrapping FRP around the column which confines the concrete core [2]. FRP can also be used in a web-bonded configuration for beams in order to strengthen the beam to column joints which, additionally, might relocate the plastic hinges away from the joint core in reinforced concrete buildings [3]. When it comes to masonry structures, the brittle failure is controlled by the tensile strength of the masonry, while the maximum induced compressive stress remains well below the available compressive strength of the masonry [4].

Masonry is a non-homogeneous composite anisotropic material made of hollow or solid bricks. The behaviour of masonry units is inelastic and complex even under very low load levels. The exact prediction of lateral load capacity of unreinforced masonry walls is not simple due to the complexity of the brick-mortar interaction [5].