

## STRUCTURAL DAMAGE ASSESMENT OF HISTORIC TRADITIONAL MASONRY BUILDINGS: A CASE STUDY

Mohamed Mostafa ABDELMEGEED<sup>1\*</sup>, Efstratios BADOGIANNIS<sup>2</sup>,  
Gerasimos KOTSOVOS<sup>3</sup>, Emanuel VOUGIOUKAS<sup>2</sup>

1 Faculty of Archaeology, Conservation Department, Fayoum University, Egypt

2 Faculty of Civil Engineering, National Technical University of Athens, Greece

3 Lithos Consulting Engineers, Athens, Greece

### ABSTRACT

*The work presented is concerned with the rehabilitation of a typical traditional masonry building built in Athens in the late 18<sup>th</sup> early 19<sup>th</sup> century. The building has suffered significant damage primarily in the form of vertical and inclined splitting of the bearing walls and fragmentation of the mortar used to bind together the masonry stones as a result of seismic excitation, lack of maintenance, construction defects, etc. The paper describes the damage suffered and investigates its causes through the use of numerical analysis techniques. It is found that the causes of damage are predominantly linked with structural deficiencies such as lack of diaphragmatic action and bracing and restoration methods are proposed. The latter include a reinforced-concrete layer at the wall crowning, strengthening (or replacement wherever necessary) of the floor timber beams and bracing in the form of external and internal reinforced concrete strips at the level of the basement floor.*

**Keywords:** *Historic traditional masonry buildings, Building materials, structural elements, deterioration phenomena, structural damage, cracking, Finite element method (FEM).*

<sup>(1)</sup>Faculty of Archaeology, conservation department, Fayoum University, Egypt (mmm04@fayoum.edu.eg)

<sup>(2)</sup>Faculty of Civil Engineering, National Technical University of Athens, Greece (batstrat@central.ntua.gr)

<sup>(3)</sup>Lithos Consulting Engineers, Athens, Greece, (gkotsov@gmail.com)

<sup>(4)</sup>Faculty of Civil Engineering, National Technical University of Athens, Greece (manolis@central.ntua.gr)