

THE VULNERABILITY ASSESSMENT AND SEISMIC REHABILITATION OF THE “NAJMODDIN KOBRA” HISTORICAL MONUMENT WITH APPLYING POST-TENSIONED REBAR

Masoud MAVIZCHI

*M.Sc. in Structural Engineering, Islamic Azad University, Yazd, Iran
m.mavizchi@iauyazd.ac.ir*

Gholam Reza AHMADI

*M.Sc. in Structural Engineering, Islamic Azad University, Yazd, Iran
ghrezaahmadi@hotmail.com*

Majid MAVIZCHI

*M.Sc. in Structural Engineering, Islamic Azad University, Yazd, Iran
m_mavizchi120@yahoo.com*

Faramarz ALEMI

*PhD of Earthquake, Assistant Professor of Sadjad Institute of Higher Education, Mashhad, Iran
F-Alemi@iiees.ac.ir*

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Najmoddin Kobra Historical Monument which dates back to 8th century is the remnant of an ancient glorious building and is located in Neghab, Khorasan Razavi (Figure 1a). According to the available evidences, this masonry structure has been threaten and harmed severely by natural and human factors and just the main place of worship is remained (Figure 1b). There have been some implementations for repairing on behalf of cultural heritage (Figure 1c) (Pictures and maps gathered from Khorasan Razavi Cultural Heritage).

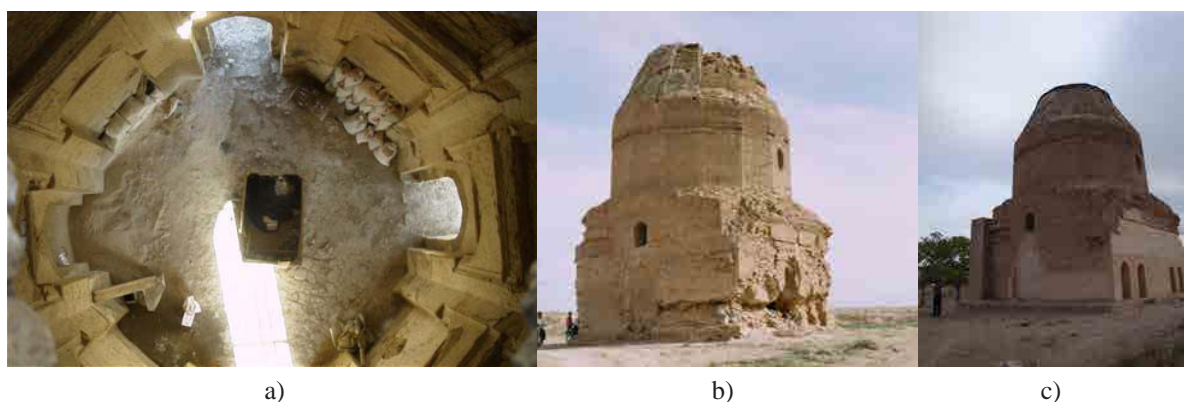


Figure 1. (a) Internal view of “Najmoddin Kobra” monument; (b) The destruction of the various parts of the building; (c) Reconstruction of the damaged parts

The structure is located on a highly-active seismic region and needs to be retrofitted properly due to its historical significance (Standard No. 2800, 2005). The purpose of this article is to provide some methods for rehabilitation of the existing brick structure through some common structural analyses (Instruction for Seismic Rehabilitation of Existing Unreinforced Masonry Buildings, 2007).

Three-dimensional finite element models of the tower have been utilized in the nonlinear finite element program Ansys (Figure 2) (ANSYS, 2007). After nonlinear static analysis (push over), it was found that likely impacts of the past earthquakes on the damages were much more than impacts of the erosion. Hence, post-tensioned rebar have been proposed as a strengthening method.

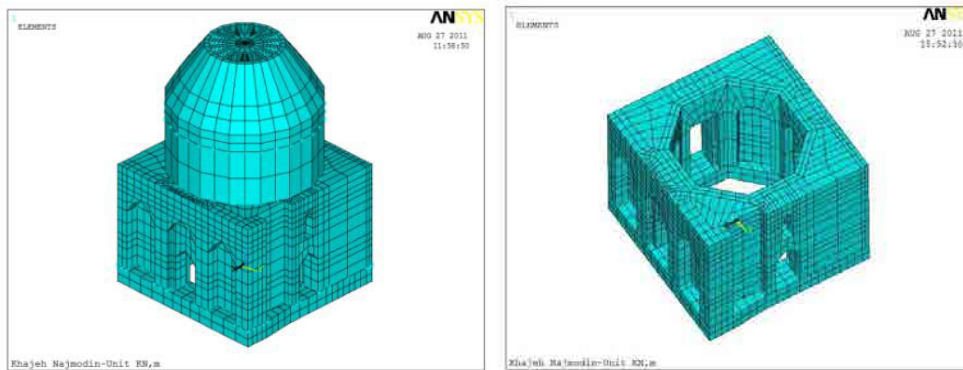


Figure 2. Modeling and discretization views of structure in ANSYS program

In conclusion, the strengthening method caused to increase the compressive stress, rigidity and shear capacity at the bottom of the body and the seismic behaviour of structure improved within acceptable limits.

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