

RELIABILITY ANALYSIS ON REINFORCED MASONRY BUILDING AGAINST EARTHQUAKE HAZARD WITH SHAKING TABLE TESTS

Vahid RAHIMI

*M.Sc. student of Earthquake Engineering, Civil Engineering Faculty, Semnan University, Semnan, Iran.
v.rahimi@students.semnan.ac.ir*

Mohammad Iman KHODAKARAMI

*Assistant professor of Earthquake Engineering, Civil Engineering Faculty, Semnan University, Semnan, Iran
Khodakarami@profs.semnan.ac.ir*

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ABSTRACT

In this paper, a new approach on assessment of the retrofitting methods for the masonry buildings is presented in order to provide an evaluation of the effects of the seismic performance improvement methods on this type of building performances. For this aim, the results of experimental research used to present a reliability analysis for evaluating the effects of reinforcement methods on the damage state in structure. With a focus on crack distribution method in samples, event tree of these tests are defined. With consideration of obtained event tree, the effect of reinforcement on damage state of samples was investigated. Result shows, whereas this method is very simple in comparison of other rigorous and more complex methods but, is very useful for fast and economic decision making in rural areas against disasters like earthquake.

INTRODUCTION

In the commissioning and operation of any systems, two results may occur; the first is system succeeds and the second is system fails. If failure system method used for analysis of system, this study called fault tree method and if succeed system method used for analysis of system, one of the study method is the event tree method. For more precise definition of the event tree can be said: "If successful performance of a wrapped system or a facility was depended to the discrete time sequence, performance of this unit can be considered as an event tree". Generally, event trees model scenario which corresponds to the successive event, causes confront of event with hazards and eventually lead to inappropriate consequences. Therefore, it seems both approaches have a same result. Fault tree method commonly used for probabilistic risk assessment (PRA). Although, the results of fault tree analysis could be modified for use in success trees (e.g., event tree). In probabilistic risk assessment, a part of system which is effective in the risks of that system determined. In other words, these parts of systems led to the creation of uncertainty in results of systems. Uncertainty analysis is a part of any assessment in engineering calculation that mostly related to the model results in which system has failed. In drawing fault tree diagram for a system, it is expected to decisive event (top event) will not occur. So, all of events that lead to occur of this event must be considered in drawing fault tree diagram. For drawing of fault tree algorithm, it seems, it is more appropriate to start from decisive event (top event). In event tree method, as it mentioned before, succeed system method used for analysis of system. Figure 1 shows a sample of event tree for an analysis of system. In this method, subsystems must act to swerve an undesirable initial event (e.g. failure a part of system) and achieve a desirable outcome (e.g. system succeeds; see Modarres (2006)).

There are many of industries and scientists whose display event trees for risk assessment such as nuclear power plant, aerospace facilities and emergency organisation (see, Peplow et al. (2004)). In this paper, event tree method, in accordance with what was described in the introduction is not used. But, the approach to the design and deliver of the event tree algorithm is used.