Abstract

The general purpose of this thesis is to evaluate the response of two unreinforced rock masonry buildings undergoing dynamic loading due to earthquakes. Each building is modeled in different ways, so that its response due to different methods of strengthening is evaluated. The method of analysis is non linear, direct integration time history, using Newmark's method. The secondary aim is to study the (estimate the best) parameters used in the analysis and examine their sensitivity towards the results.

For the first simple building, 3 models are formed:

1 Model without strengthening.
2 A model strengthened with a diaphragm (slap).
3 A model strengthened with reinforced concrete jackets.

For the second, more complex building, 4 models are formed:

4 Model without strengthening.
5 A model strengthened with a diaphragm-Slap.
6 A model strengthened with a bond beam at certain height of masonry walls.
1 A model combining strengthening with a diaphragm and a bond beam.

Each model is analyzed for:

2 Modal analysis.
3 Pseudo static analysis using gradually increasing base acceleration.
4 Time history analysis using actual accelerograms of real earthquakes.

For each of the above, a linear and non linear analysis is performed. A complex material model is used so that the characteristics of the actual material are sufficiently expressed. The results of linear and non linear analysis are compared. Additionally each of the methods of strengthening used, is compared with the un-strengthened model so that its contribution is evaluated. Further more the results of the non linear analysis are compared with seismic behavior of actual masonry buildings and other experimental tests. The software used for analysis is A.D.I.N.A (Automatic Dynamic Incremental Nonlinear Analysis) version 8.1.