



## Implementazione di una procedura analitica non lineare per la valutazione del rischio sismico di aggregati edilizi

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### ABSTRACT

Starting from the simplified procedure developed and proposed in [1] to evaluate the seismic vulnerability of building clusters, the Authors have implemented the algorithm in Visual Basic (VBA) environment. This paper presents and discusses the results obtained by applying the procedure to some study cases; such results have been compared with those deriving by using equivalent frame models, typically known as a valid alternative to the finite element modelling. We can resume the principal characteristic of simplified method as: 1. the study on each floor is independently from other, 2. the variability of axial load is neglected, 3. torsionals effects are generally neglected. The wall bands are rigid, this hypothesis involves that the failure are localized in the walls. For them is assumes: 1. elastic behavior up to yield point, followed by plastic behavior up to failure, 2. an effective height that take into account the stiffening effect due by opening, 3. provided collapse mechanisms are flexural and shear for diagonal cracking, 4. ultimate deformation is 0.4 (shear) % or 0.6 % of effective height (flexural). The ratio Capacity/Demand in term of displacement provides the results of analysis, if  $C/D \geq 1$  for each floor, the outcome is positive. The equivalent frame model used in the study is the SAM (Magenes Calvi 1994). In this case the bands can failure like the walls; for the last is assumes: 1. inelastic behavior, 2. an effective height calculated by the same method of simplify procedure, 3. the collapse mechanism are flexural, shear for diagonal cracking and sliding joints, 4. the ultimate displacement is calculated by evaluating of the chord rotation.

The aim of this study is to evaluate potentials and limits of the simplified procedure, in order to develop a rapid and effective tool to use in situations of extreme complexity, such as those characterizing the masonry clusters.

This tool can be particularly useful both to assess the damage and to plan the seismic upgrading.

[1] Monti G., Vailati M., (2009). "Procedura di analisi non lineare statica per la valutazione sismica degli edifici in aggregato", *XIII convegno ANIDIS "L'ingegneria Sismica in Italia"*, 28 Giugno-2 Luglio, Bologna.