

## ***Interactive comment on “A physical approach on flood risk vulnerability of buildings” by B. Mazzorana et al.***

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This paper presents a very interesting work on the structural and physical vulnerability of buildings to floods. The topic is very actual and the developed methodology very innovative. The paper is very well structured and explained. Nevertheless, there are some point that could be improved. Please find in the following some minor revisions could improve some points which might result not very clear to the reader. If clarified the afore-mentioned points this very interesting work will be a great contribution on the vulnerability assessment of buildings to floods.

1. General comments:

The state of the art is missing some important works on the vulnerability of buildings

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to flood as for example the Australia guidelines for reducing vulnerability of buildings to flood damage (Guidance on building on flood prone areas).

The information provided in Figure 1 is not schematically presented and it includes some points which are not discussed at all at this manuscript. Maybe it could be substituted by a simpler one which will facilitate the reader to understand easier the importance of the presented work in the general scheme of the vulnerability assessment procedure.

In the application to the case, I think it would be necessary to include more information of the structural characteristics of the analysed building (load bearing system, material, resistances, some geometrical features). Precise information on the simulation of the flood actions is also necessary. The same holds also for the results of the analysis.

Although you provide some information on the forces and stresses (please explain to which conditions they correspond. Are they the maximum ones?), the information on the check of the ULSm STR is very poor. This information is the most important for the vulnerability and should be highlighted here.

The vulnerability to geomechanical processes is mentioned very generally and at the end it is not applied in the case study. I think it would better to drop just a comment on this rather than present it as a part of your methodology. Otherwise, a more specific description should be included.

We provide information given by the Eurocode on the definition of the limit damage states, but then you do not use the serviceability limit. Please explain more on that. It is important to consistent terminology in the text about the hazard type. Is it debris flow or floods?

2. Specific comments:

P 1413, I 29: Maybe it is better to use back analysing instead of recalculating.

P 1416, I 29: Response spectrum usually refers to displacements, velocity or accel-

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eration which is not the case in the methodology that you use, not presented in the results.

P 1417, l 11: I think it will be clearer to the reader if you complete the phrase with “expressing its intensity”.

P 1417, l 10. Use capitals after a,b,c

P 1418, l 1: This sentence is too long and not very clear.

P 1418, l 9: Replace extend by extending

P 1419: l 29: Please specify which are the conserved and primitive variables

P 1420, l 5 and l 15: The symbols  $W$  and  $r$  are not very clearly defined in the text.

P 1424, l 17: list the variables one below the other, or next to the other keeping together the symbol and its definition.

P 1426, section 2.3.3: This must be explained together with what is written in section 2.2.2. Please check also the previous comment on the geomechanical analysis. Furthermore it is 2.2.2 and not 2.1.2.

P 1446, Fig 6: I think that this figure does not provide any additional information to what is explained inside the text. What does KO stand for? I doubt whether it is necessary here.

p. 1452 ,Fig 11: Figure B. It should be deposit and not deposito. Furthermore, the classification of deposits is different in A and in C. It would be nice to get them homogeneously classifies in the calculated and the observed data. If in A there are not any areas of deposit greater that 1m, this class should be deleted from the legend.

Fig 3: Mark the number corresponding to each façade of the buildings. Although the results are presented for each side separately, we do not know which they are.

Fig 4: Why is there this step for 2000 N/m<sup>2</sup>?

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