Institute for Sustainability and Innovation in Structural Engineering

Seismic behaviour of dry-stack masonry structures: results from a recent experimental and numerical campaign

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Universidade do Minho

Outline:

- Introduction
- Experimental Campaign
  - Characterisation of dry-joint interfaces
  - Shaking table tests of rocking blocks
  - Shaking table tests of Vertically Spanning Strip Walls
- Numerical Campaign
  - A general non-smooth multi-impact model for rocking
  - A viscous damping model for block-based modelling of rocking
  - Modelling rocking with a novel contact constitutive law
  - Modelling the Vertically Spanning Strip Wall
- Conclusions

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- Summary and Conclusions

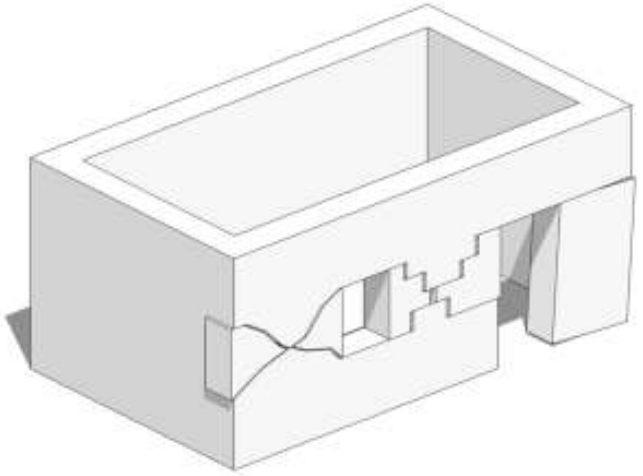
Masonry structures are part of our heritage…

Earthquake

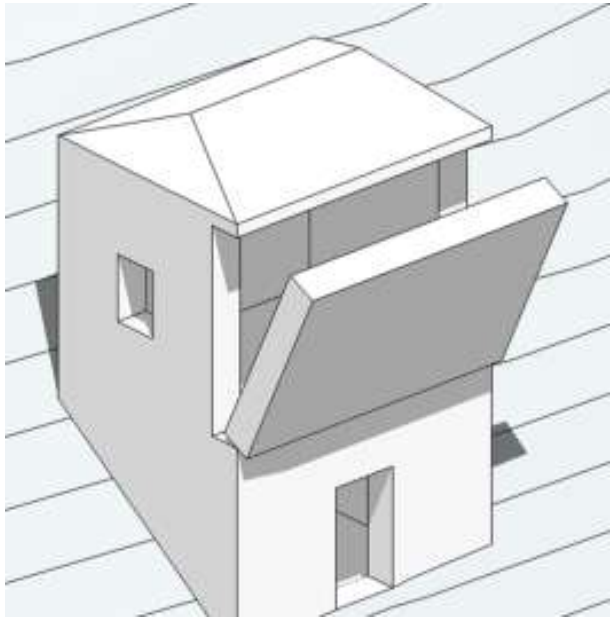
… but extremely vulnerable against earthquakes

Failure mechanisms of masonry

In-plane mechanisms



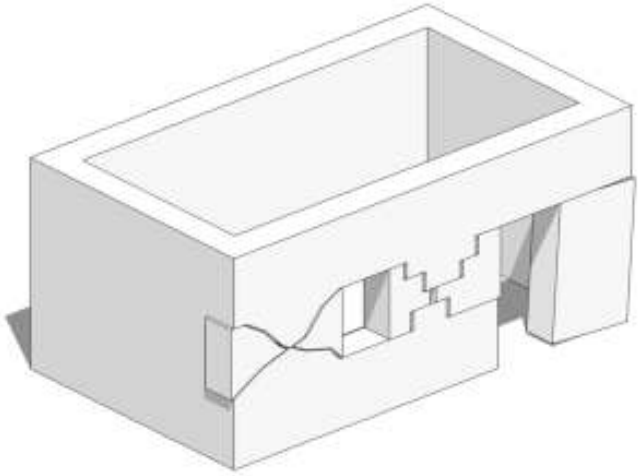
Out-of-plane mechanisms



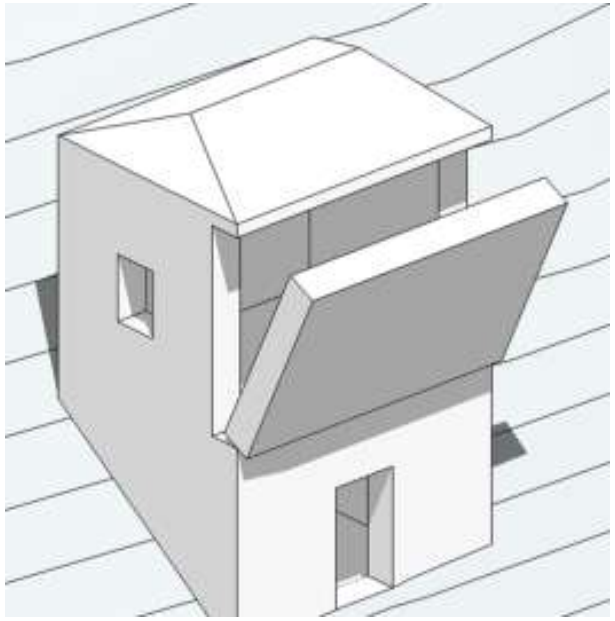
Out-of-plane are the most destructive

Failure mechanisms of masonry

In-plane mechanisms



Out-of-plane mechanisms



Research objective

Dry-joint masonry

Out-of-plane are the most destructive

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Summary and Conclusions:

- Seismic behaviour of dry-joint masonry structures
- Conjoined experimental and numerical campaign
- Experimental work:
  - Characterisation of interfaces
  - Shaking table tests on i) rocking blocks & ii) vertically spanning strip walls
  - Statistical observations on the dynamic response
- Numerical work:
  - Development of impact, damping, contact and rocking models
  - Comparison and validation with experiments

Thank you for your attention!

Website: stand4heritage.org

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