Some Guidelines on Structural Behaviour in Case of Fire in Historical Buildings

COST C-17 Meeting

Vienna, Austria

December 7-9th 2004

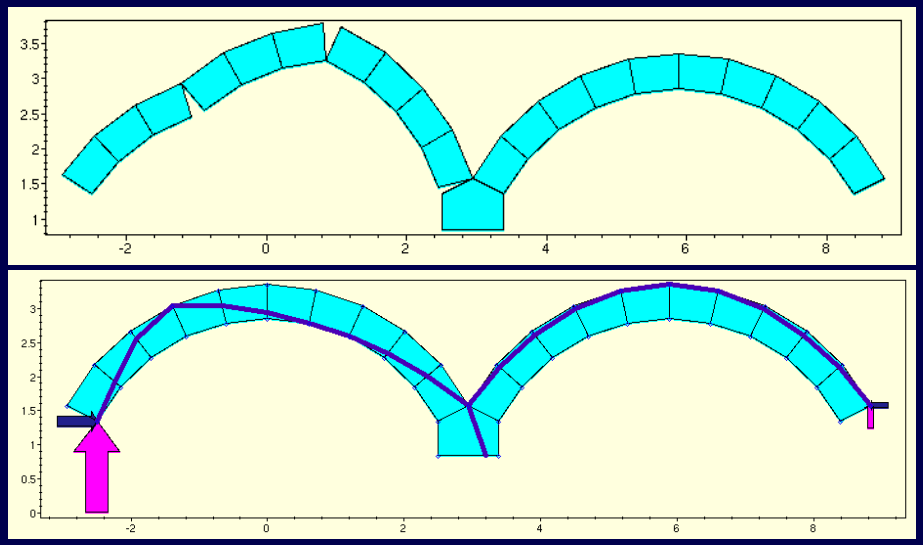
Carlos Villagrá Fernández

Instituto de Ciencias de la construcción Eduardo Torroja
High Council of Scientific Research

Two analysis models for masonry structures

Model based on force lines

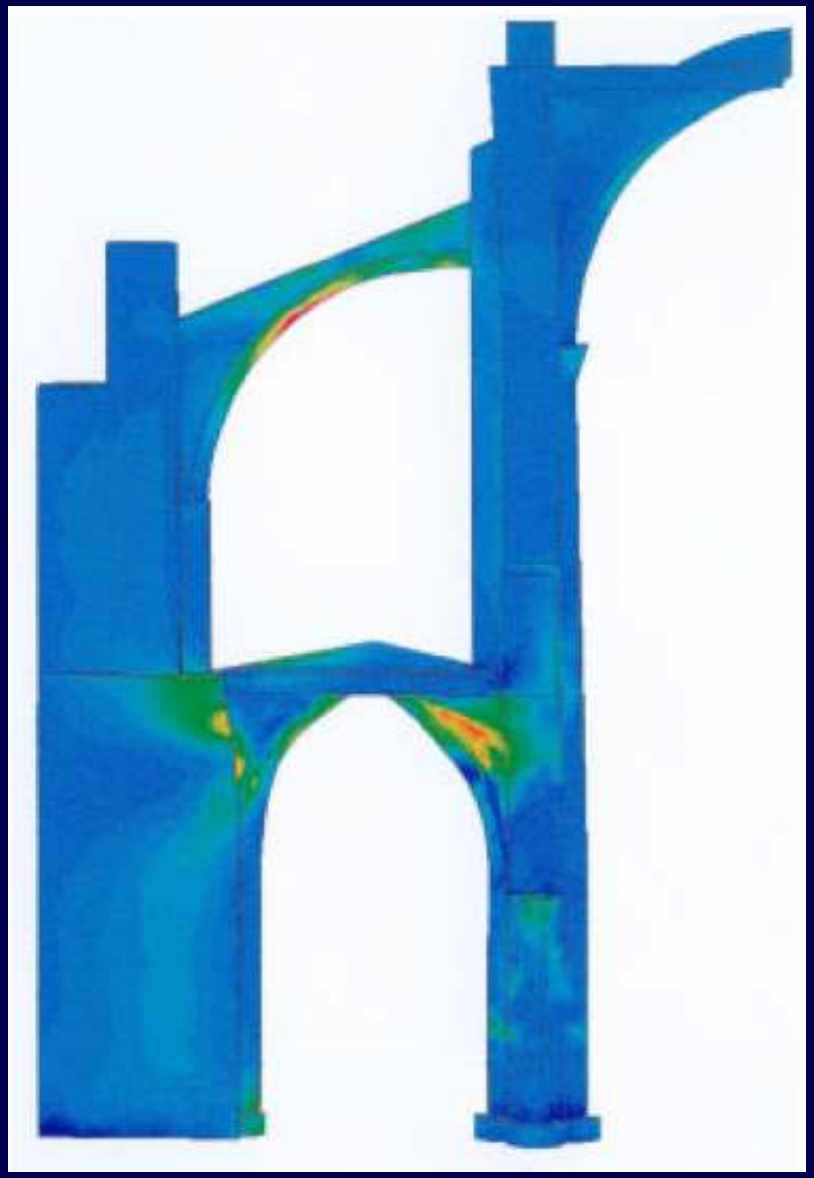
- Behaviour of rigid body for each wedge-piece
- Force line inside the arch
- The objective is to find an equilibrated solution, not the "real" one.



Two analysis models for masonry structures

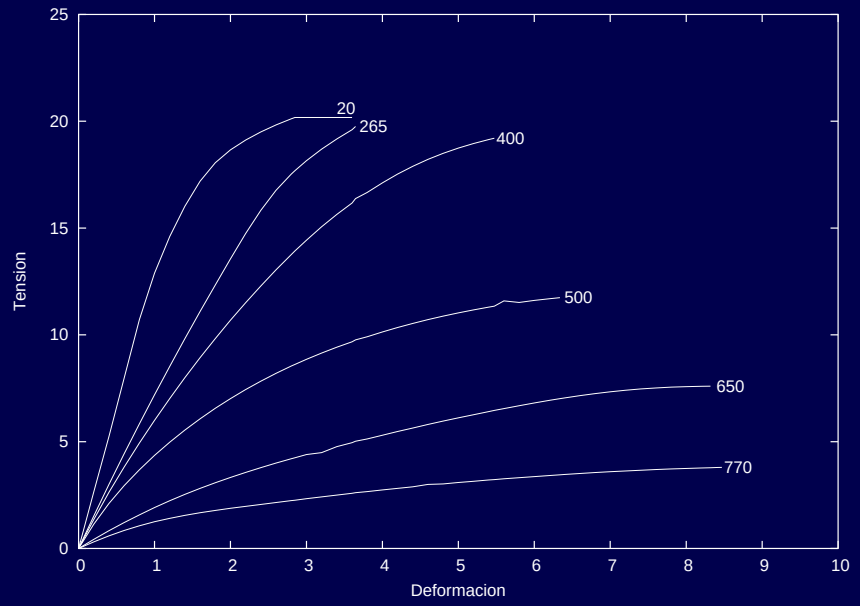
Model based on FEM with damage

- Based on concrete behaviour
- Non-elastic and non-linear material
- Roughly [F]=(1-d)[K][D]

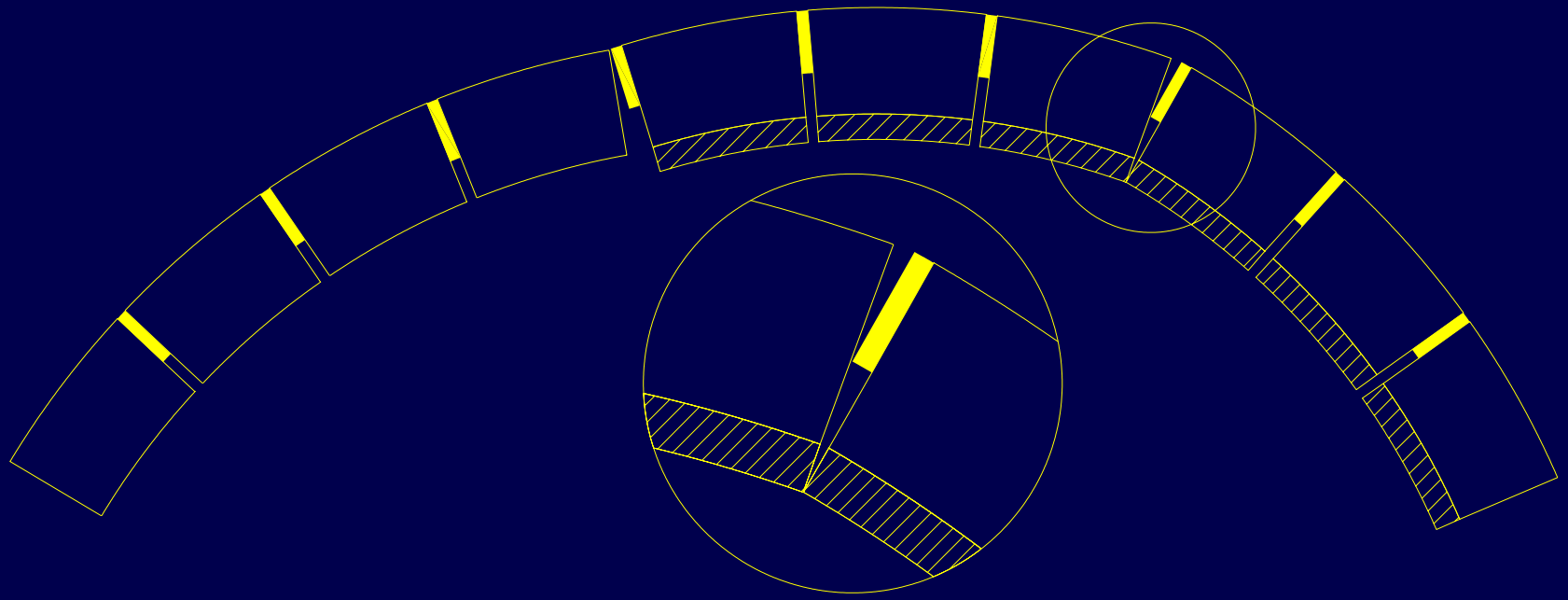


Damage model in case of fire

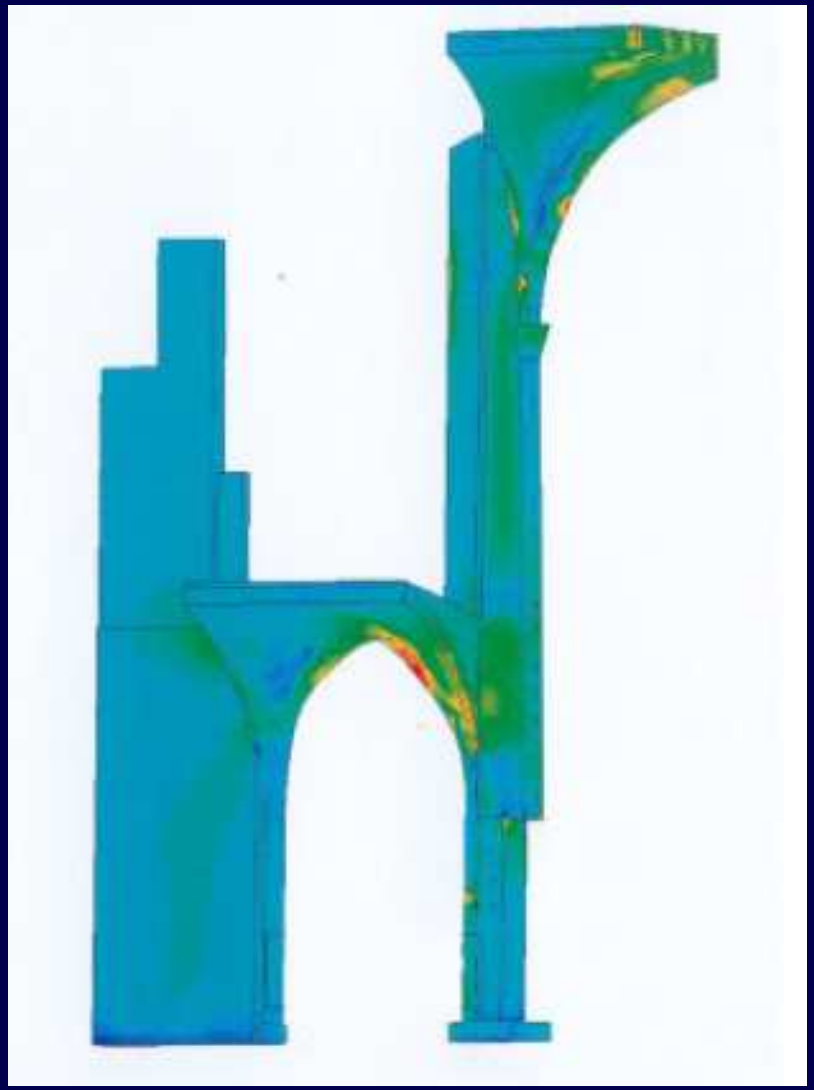
$$[F]=(1-d)(1-d')[K][D]$$



Possible configuration of an arch with damage on mortars or stones



Possible configuration of an arch with damage on mortars or stones



Conclusions

- Mechanical analysis is not the most important point in case of fire in heritage buildings.
- This work line derives from concrete strutures models, where theoretical bahaviour is closer to real behaviour.
- Theoretical results shoud be contrasted with tests.