CHARACTERIZATION AND EVALUATION OF STRUCTURAL PERFORMANCE OF MASONRY STRUCTURES

Adrian DOGARIU

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Continuous models for masonry

- **Advanced models**
  - Micro-model
  - Simplified – layer model
  - Detailed – interface model

- **Two phase materials**: brick units and mortar are explicitly represented

- **Micro-modeling**
  - In the micro-model, each component of masonry – unit, mortar (simplified), and unit/mortar joint (detailed) – must be represented by with different finite elements.
Continuous models for masonry

- Macro-model – homogenization
  - use an anisotropic continuum model that establishes the relation between average stresses and average strains in masonry, considering composite masonry as a homogeneous material
Discontinues models for masonry

- Recently a considerable attention has also been given to rational assessment methodologies, to be directly consistent with the discontinuous nature of structural masonry

- Discrete crack

- Smeared crack

- Interface smeared crack

- Use of joint elements
Material models

- Concrete Smeared Cracked
- Brittle Cracking
- Concrete damage plasticity
- Etc.
Physical models for masonry infill panels

- In the case of masonry bracing walls, the tension field is ignored, presuming that only the compression field works, it being modeled as an equivalent diagonal strut

- Panagiotakos & Fardis
- Mostafaei & Kabeyasawa
- Al-Chaar
Macro-elements for masonry facade

- Simple approaches to quickly assess capacity of the masonry structures.
- Vulnerable wall can be schematized considering only the weak parts (i.e. spandrel and pier)
  - as macroelements or
  - beam elements joined by rigid elements.
Limit analysis for masonry buildings

- A very practical method to establish the masonry building capacity, namely the “limit analysis”.
- Only the ultimate capacity of the structure may be obtained.
- The modeling of masonry structures can be divided into two types: local and global modeling.
Examples of numerical simulations

- Masonry retrofitted by SSP
Examples of numerical simulations

- Masonry buildings