

23/11/2018, Università degli Studi di Modena

GEOTECHNICAL FEA WITH CODE_ASTER & SALOME-MECA

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code_aster

IN ITALIA

SUMMARY

PART 1 - Overview of geotechnical FEA capabilities of Code_Aster and Salome-Meca

PART 2 - Constitutive models

PART 3 - Interfaces, discontinuities and multiphysics

PART 4 - Positive aspects of an Open Source framework



WE WON'T COVER

- Soil dynamics and seismic simulation
- Special procedures (such as `DEFI_SOL_EQUI`)
- Micro-macro approach (`POLYCRISTAL`)
- ...

BIO

- Chartered Civil (Geotechnical) Engineer since 2010
- Geotechnical Engineer at ENVIA since 2016
- Working experience in Italy, Australia and New Zealand
- Industrial PhD student at SEHM2 (University of Bologna)

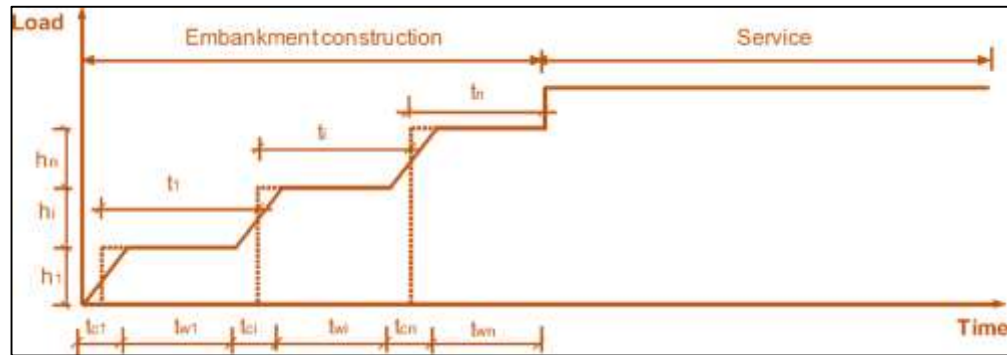


Geologia Geofisica Ambiente
www.envia.it

FELL IN LOVE WITH CODE_ASTER IN 2014

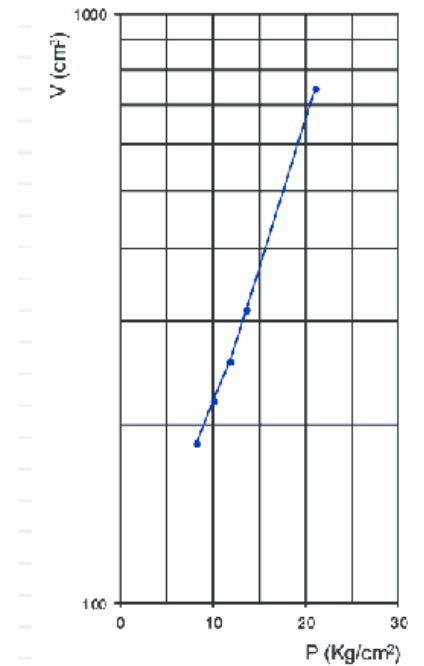
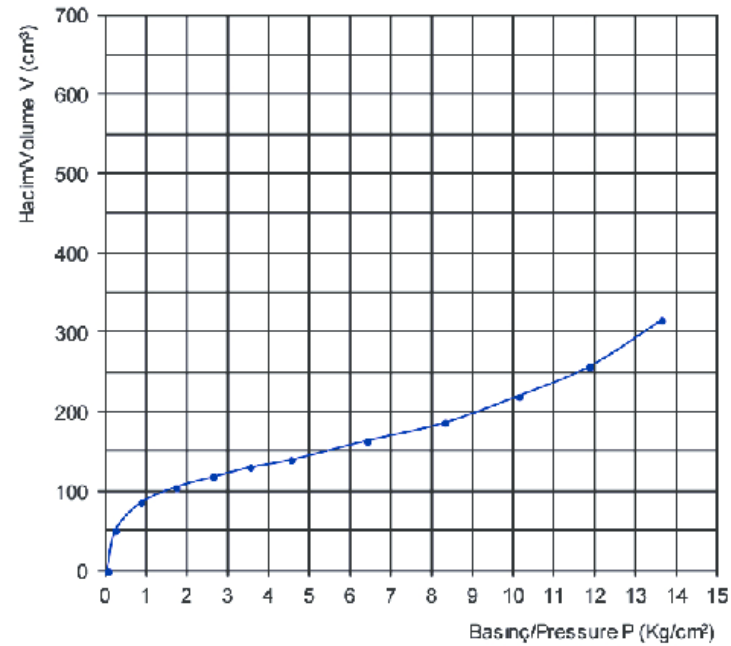
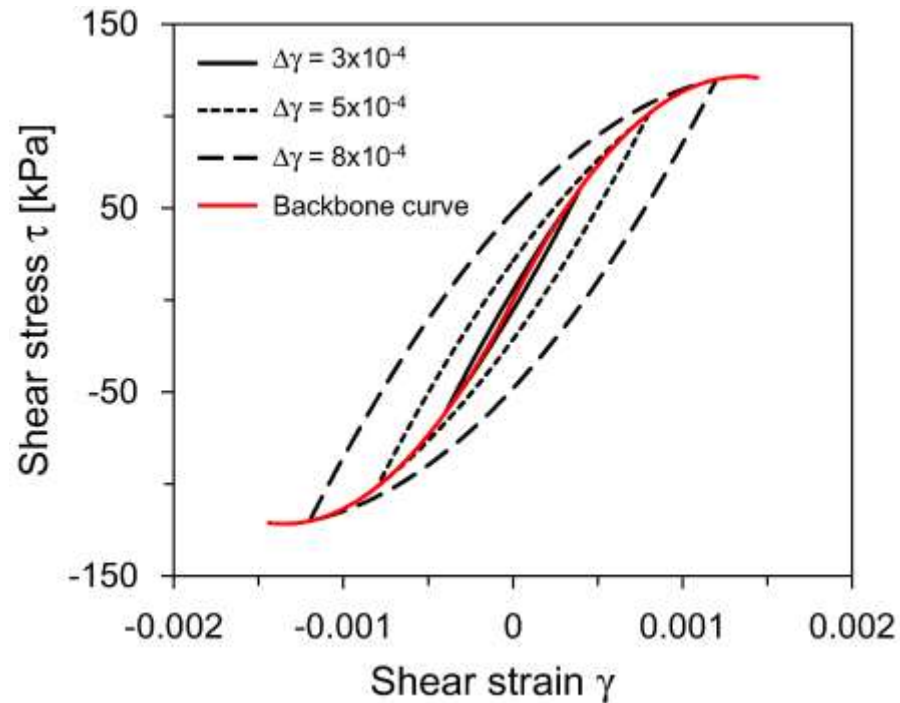
PART 1 – Overview of geotechnical FEA capabilities of Code_Aster and Salome-Meca

Construction sequences



PART 1 – Overview of geotechnical FEA capabilities of Code_Aster and Salome-Meca

Non-linearity



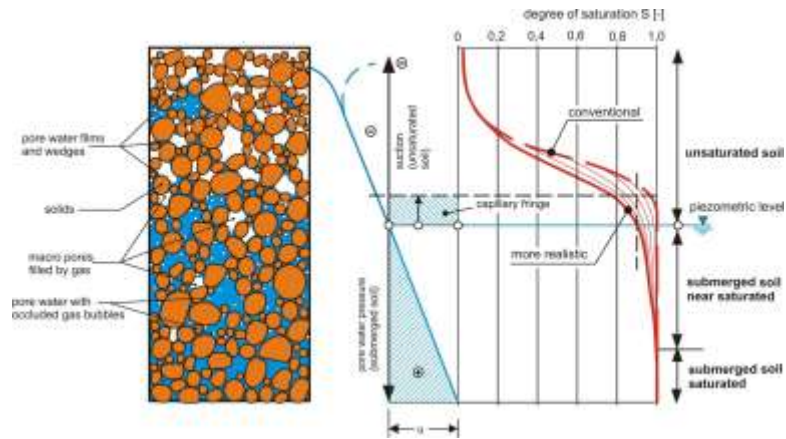
PART 1 - Overview of geotechnical FEA capabilities of Code_Aster and Salome-Meca

Interfaces & discontinuities



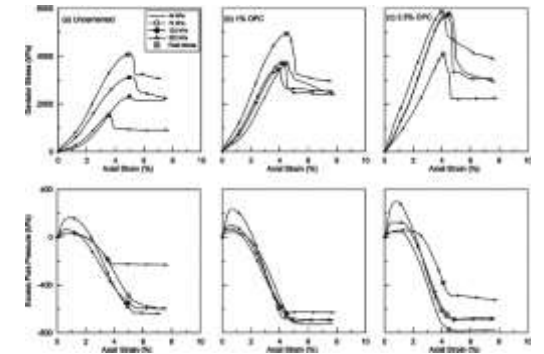
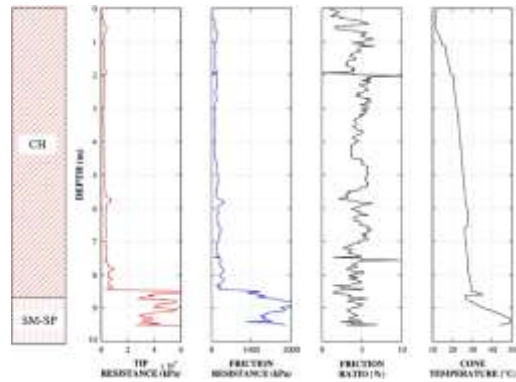
PART 1 - Overview of geotechnical FEA capabilities of Code_Aster and Salome-Meca

Multiphysics



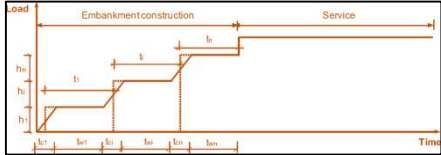
PART 1 – Overview of geotechnical FEA capabilities of Code_Aster and Salome-Meca

Parameters dispersion

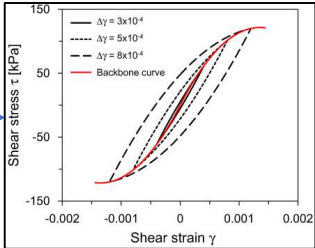


PART 1 - Overview of geotechnical FEA capabilities of Code_Aster and Salome-Meca

Full control on stages and possibility to work on multiple meshes to simulate construction/excavation phases



Wide choice of constitutive models tailored to geomaterials



Wide range of interface & discontinuities simulation strategies



Robust multiphysics coupling strategies



OpenTurns

PART 2 - Constitutive models

Various classes of constitutive models are available:

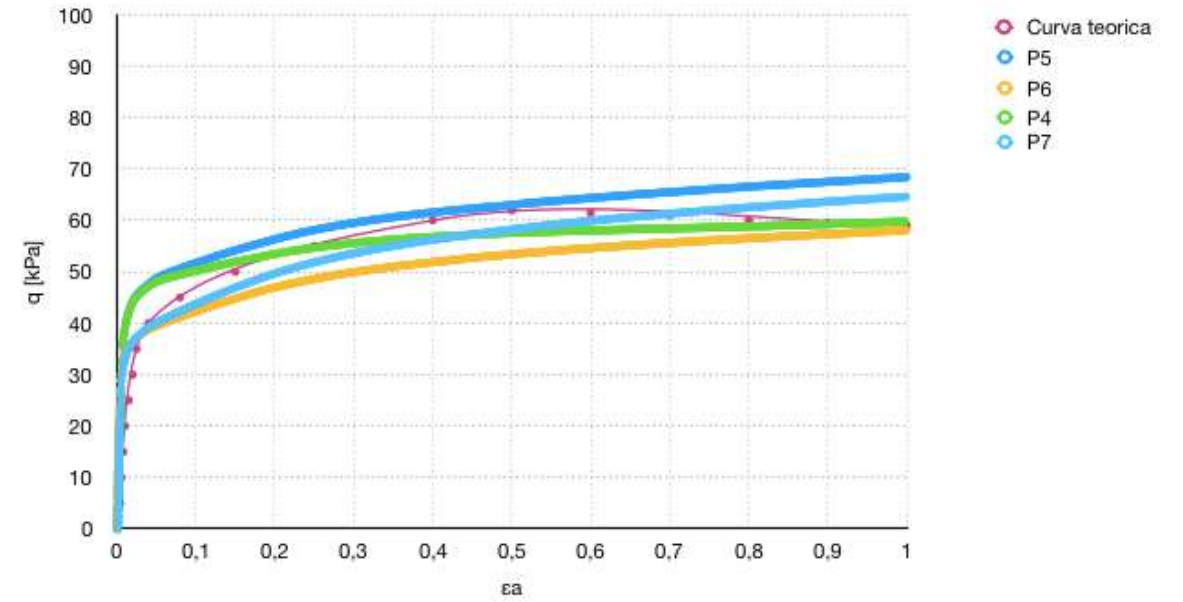
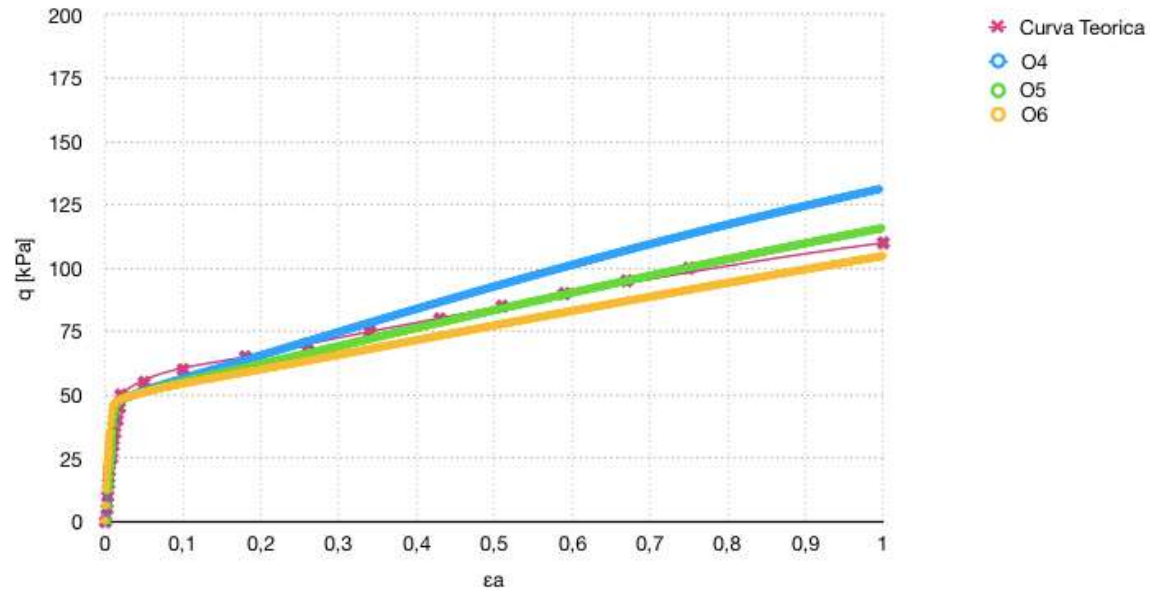
- Basic (e.g. Mohr-Coulomb, Hoek-Brown)
- Vol. Hardening models (e.g. Cam-Clay)
- Double Hardening models (e.g. CJS, Hujeux)
- Special-purpose models (e.g. ELAS_GONF, BARCELONA)
- User-defined (MFront)

PART 2 - Constitutive models

	Basic	Vol. Hardening	Double Hardening
Failure	●	●	●
Monotonic loading (stiff soil/rock)	●	●	●
Monotonic loading (soft soil)	●	●	●
Excavations (and other multi-stage)	●	●	●

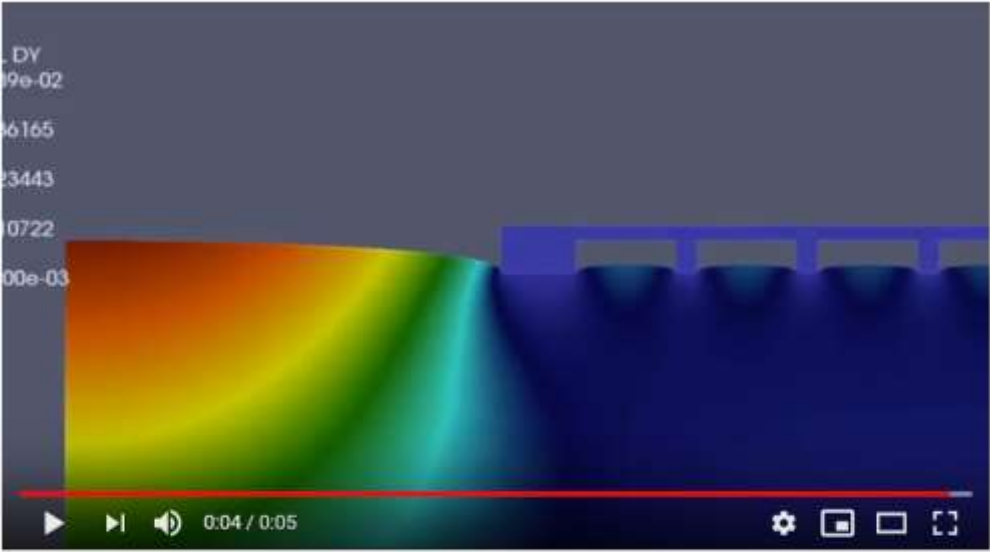
From H.F. Schweiger (2017) - ISSMGE

PART 2 - Constitutive models



From A. Grisenti (2018) - UNIBO

PART 2 - Constitutive models



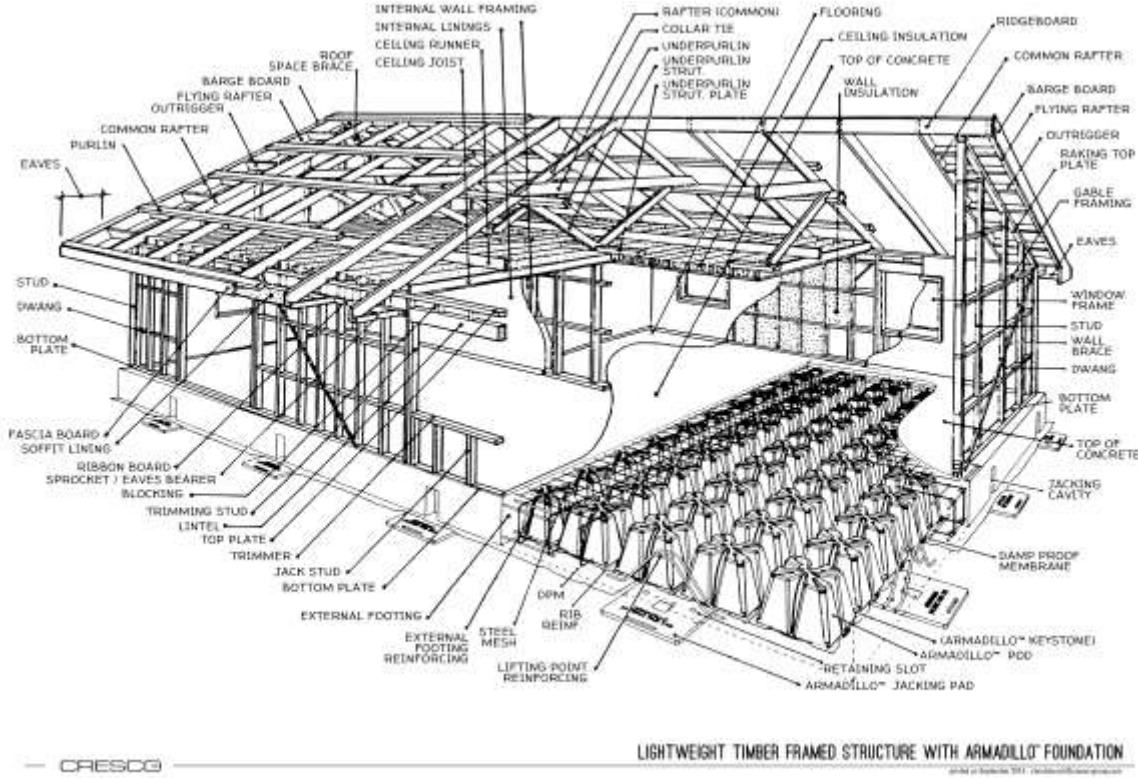
Ribbed biaxial slabs on expansive soils

61 visualizzazioni

0 likes 0 commenti CONDIVIDI SALVA

Crescoengineers
Pubblicato il 5 ott 2017

ISCRIVITI 14



LIGHTWEIGHT TIMBER FRAMED STRUCTURE WITH ARMADILLO® FOUNDATION

Courtesy of Cresco Engineers NZ

PART 3 - Interfaces, discontinuities and multiphysics

Various interfaces/discontinuities strategies are available:

- Simple CONTACT (with or w.o. friction)
- JOINT elements (e.g. JOINT_MECA_FROT)
- X-FEM

USEFUL FOR BOTH SOIL-STRUCTURE INTERACTION AND INTERNAL DISCONTINUITIES

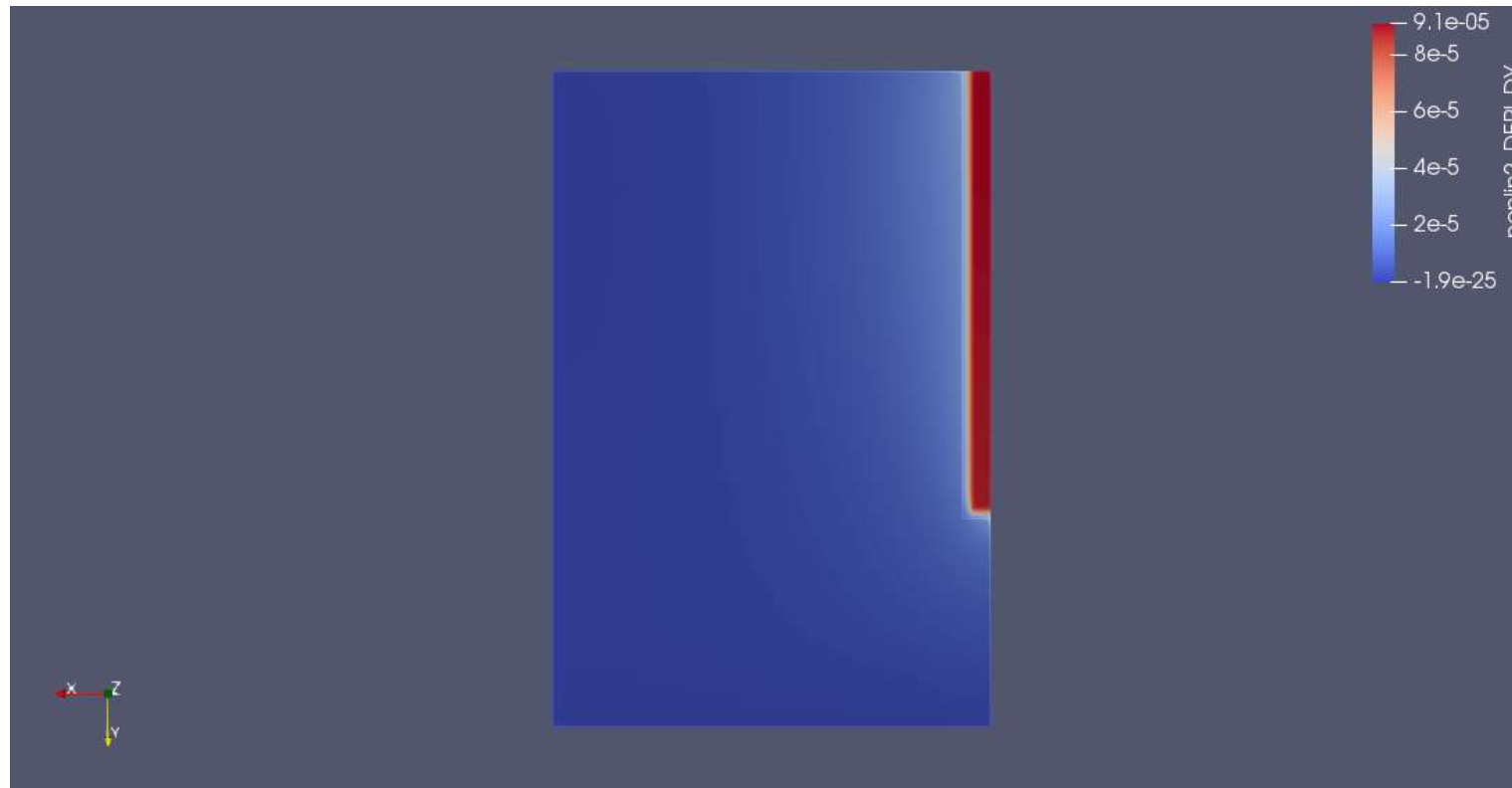
PART 3 - Interfaces, discontinuities and multiphysics

Multiphysics in KIT form:

- Fully saturated
- Partially saturated
- Thermally-coupled

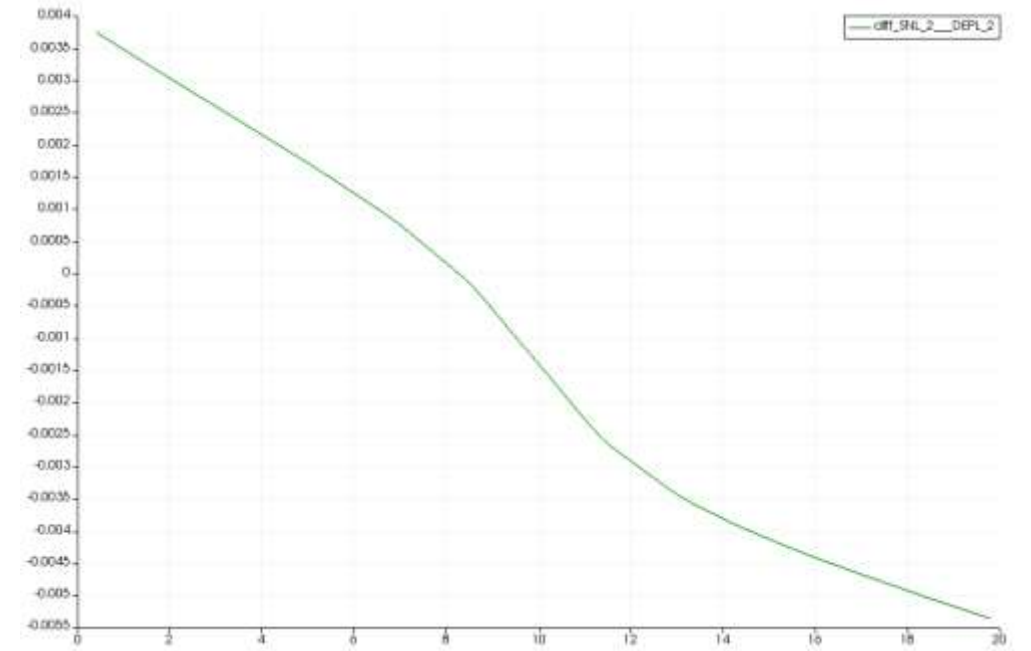
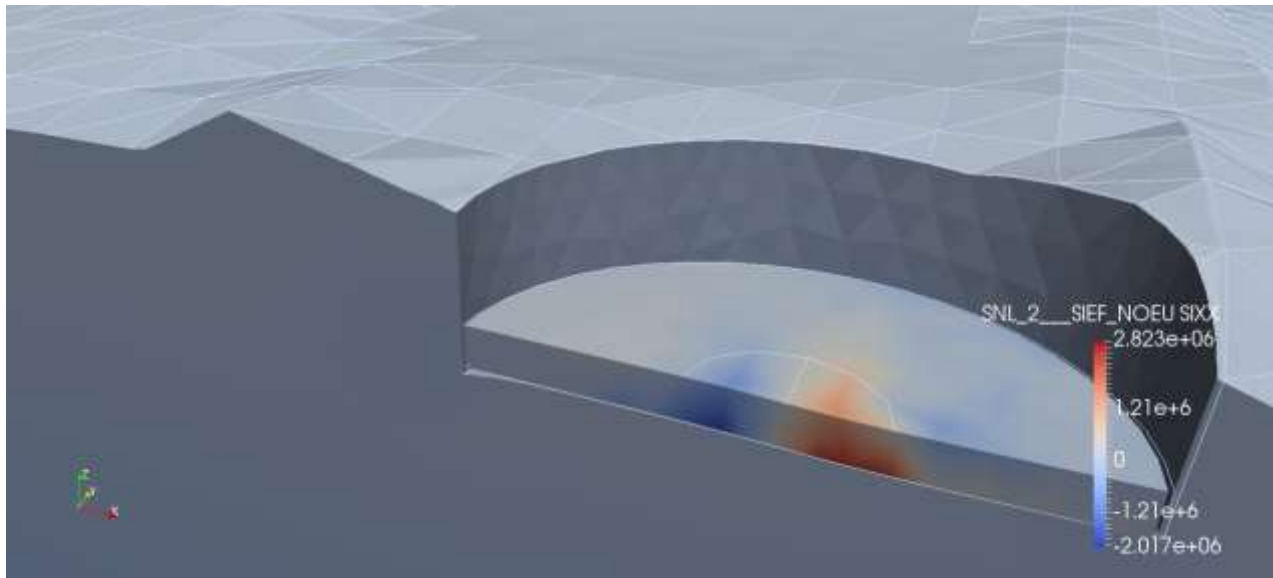
AN EXTREMELY VERSATILE WAY TO APPROACH MULTIPHYSICS IN GEOTECHNICS

PART 3 - Interfaces, discontinuities and multiphysics



From C. Staboli (2018) - UNIBO

PART 3 - Interfaces, discontinuities and multiphysics



PART 4 – Positive aspects of an opensource framework

The benefits of a strong community:

- Fast prototyping and development
- Validation, validation, validation
- R&D made easier



PART 4 - Positive aspects of an opensource framework



An example of **BIM workflow** currently under development at ENVIA



THANK YOU!



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