RILEM Technical Letters (2017) 2: 99-107
DOI: http://dx.doi.org/10.21809/rilemtechlett.2017.44 Supplementary material

Numerical benchmark campaign of COST Action TU1404 – microstructural modelling

Supplementary material
Model 6 - Micromechanical numerical model

Mateusz Wyrzykowski[1], Julien Sanahuja[2], Laurent Charpin[2], Markus Königsberger[3], Christian Hellmich[3], Bernhard Pichler[3], Luca Valentini[4], Túlio Honório[5], Vit Smilauer[6]*, Karolina Hajkova[6], Guang Ye[7], Peng Gao[7], Cyrille Dunant[8], Adrien Hilaire[9], Shashank Bishnoi[10], Miguel Azenha[11]

1 Empa, Swiss Federal Laboratories for Materials Science and Technology, Switzerland
2 EDF, R&D MMC, France
3 TU Wien, Austria
4 University of Padua, Italy
5 Université Paris-Est, Laboratoire Navier (UMR 8205), CNRS, ENPC, IFSTTAR, France
6 Czech Technical University in Prague, Czech Republic
7 TU Delft, The Netherlands
8 Department of Engineering, University of Cambridge, UK
9 EPFL, Lausanne, Switzerland
10 IIT Delhi, India
11 ISISE, University of Minho, Portugal

Received: 5 December 2017 / Accepted: 25 December 2017 / Published online: 30 December 2017

1 Introduction

In this document the input data for the *Model 6 - Micromechanical numerical model* used in the numerical benchmark [1] is presented as a supplementary material.

2 Input data - model 6

Hydration model: CEMHYD3D
Resolution: 1 um/voxel
RVE size: 100 x 100 x 100 um
PSD of cement: Indirectly through Blaine surface area
Clinker mineralogy: Entered from experimental values
Min particle diameter: 1 um
Max particle diameter: 46 um

Model for elasticity:
Formulation: Continuum micromechanics
Multiscale approach: Yes
Use of volume fractions: Yes - from percolated 3D microstructure
Intrinsic elastic modulus for C-S-H (LD): 21.7 GPa
Intrinsic elastic moduli for other hydrates: 22.4-42.3 GPa
Intrinsic elastic modulus for clinker minerals (without gypsum): 125-145 GPa

Model for strength:
Formulation: Numerical micromechanics
Multiscale approach: Yes
Weakest solid phase causing failure: C-S-H globule
Failure law: Softening of C-S-H globule.

References

[1] M. Wyrzykowski, et al., Numerical benchmark campaign of COST Action TU1404 – microstructural modelling. RILEM Technical Letters (2017) 2: 99-107. http://dx.doi.org/10.21809/rilemtechlett.2017.44

* Corresponding author (this supplementary material): Vit Smilauer, E-mail: vit.smilauer@fsv.cvut.cz