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# MESOSCALE MODELLING OF CONCRETE MATERIAL WITH POLYPROPYLENE FIBRES INCLUSION UNDER HIGH TEMPERATURE

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In the last decades the wide use of high-performance and ultra high-performance concrete enhanced research on the severe issue represented by spalling phenomenon, which typically this kind of concrete materials undergo, when subjected to high temperature conditions. Inclusion of polypropylene fibres in the concrete mix design has been envisaged as a possible solution to decrease the risk connected to spalling. Indeed, during thermal heating the polypropylene fibres are expected to evaporate, thus increasing concrete permeability and consequently reducing the pore pressure into the cement matrix [1].
In this work three-dimensional mesoscale modelling of concrete under high temperature have been carried out taking into account different characteristics for aggregates and cement paste. Concrete has been characterized as a heterogeneous material distinguished into its three components: aggregates, cement paste and a thin layer between the two known as *interfacial transition zone* ITZ [2].
The variation of cement diffusivity during thermal cycles for different percentage in volume of polypropylene fibres has been analyzed, thanks to an update to an already validated FEM research code for concrete, in order to evaluate pore pressure evolution during the evaporation of polypropylene fibres. Numerical results have been calibrated and finally validated against experimental data to answer to spalling forecasting of cementitious materials.

## REFERENCES

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