

The influence of natural aggregates on the performance of replacement mortars for ancient buildings: the effects of mineralogy, grading and shape

Summary

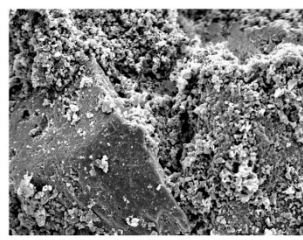
The main objective is to evaluate how the characteristics of aggregates influence the microstructural properties and the physical, chemical and mechanical behaviour of mortars, especially for replacement mortars. The pursuit of this objective led to advance and development of scientific knowledge about the influence of mineralogy, grading and shape of the aggregates in the behaviour of mortars, allowing the choice of mortars composition that meet the compatibility requirements established in previous research work. To get these goals, a methodology has been established that involved a definition of the different mortars formulation (varying the binder and sand – mineralogy, grading and shape) and a vast experimental study that allowed to evaluate the influence of aggregate factors (mineralogy, grading and shape) on the behaviour and performance of mortars.

The durability of the applied renders in panels on large scale model was also object of investigation, thus allowing to evaluate the behaviour of support/mortar system in real conditions of application, optimize the various parameters of the aggregates and define appropriate sands for different types of applications. The results show that the aggregates characteristics have a relevant influence on the microstructure of mortars, namely in air lime mortars. However, different ranges of pores influence different properties of mortars, regardless the type of binder or aggregate used in their composition.

Generally, a reduction in macroporosity leads to higher mechanical strength, namely compressive strength. However, the reduction in the diameter of the macropores can lead to an increase of capillary porosity and microporosity, which tends to compromise the durability.

Keywords

Aggregate, grading, mortar, render, performance.



Experimental study.



PhD student

Ana Rita Lopes dos Santos

PhD program

Civil Engineering (IST, University of Lisbon)

Supervisors

Rosário Veiga (LNEC) and António Santos Silva (LNEC)

Co-supervisor

Jorge de Brito (CERIS, IST, University of Lisbon)

Period

2014-2019

Funding

LNEC scholarship