

Production and characterization of eco-efficient recycled cement compressed earth blocks

Summary

While earth construction has experienced a prolonged period of dormancy, the growing demand for sustainable building practices has sparked renewed interest. Compressed stabilised earth blocks (CSEB) have emerged as a promising solution, particularly when stabilised with cementitious materials such as ordinary Portland cement. However, this approach does not align with the sustainability goals of earth construction. As a more environmentally friendly alternative, low-carbon thermoactivated recycled cement emerges as a preferable stabilizer. By using this innovative binder, it becomes possible to reduce CO2 emissions, minimize the depletion of natural resources, while allowing the reuse of construction and demolition waste.

The thesis aims to conduct an extensive experimental campaign focused on producing and characterising eco-friendly CSEB with low-energy recycled cement derived from waste concrete. Laboratory tests will be conducted to evaluate the physical, mechanical, thermal, and durability properties of the new CSEB. Additionally, in-situ tests will involve subjecting various CSEB walls to different natural environments for long-term exposure. Overall, it is expected that the performance of CSEB incorporating recycled cement from waste concrete will be comparable to that of CSEB incorporating recycled cement from cement paste.

Keywords

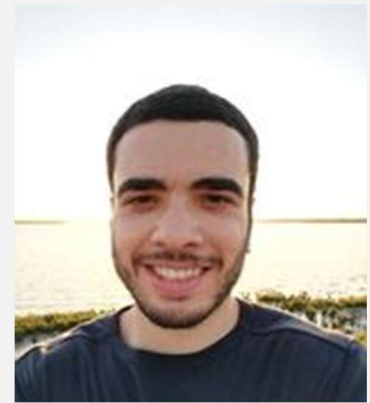
Compressed stabilized earth blocks, recycled cement, sustainability.



Compressive strength evaluation for a saturated specimen.



Small sample of the CSEB used for the walls production.



PhD student

Ricardo Jorge Tomé Cruz

PhD program

Civil Engineering (IST, University of Lisbon)

Supervisor

José Bogas (CERIS, IST, University of Lisbon)

Co-supervisor

Paulina Faria (FCT, Nova University of Lisbon; CERIS, IST, University of Lisbon)

Period

2022-2025

Funding

FCT Research Project – Eco+RCEB (PTDC/ECI-CON/0704/2021)