

## Mechanical Contribution of Silica Fume and Hydrated Lime Addition in Mortars Assessed by Ultrasonic Pulse Velocity Tests

**Authors :** Nacim Khelil, Amar Kahil, Said Boukais

**Abstract :** The aim of the present study is to investigate the changes in the mechanical properties of mortars including additions of Condensed Silica Fume (CSF), Hydrated Lime (CH) or both at various amounts (5% to 15% of cement replacement) and high water ratios (w/b) (0.4 to 0.7). The physical and mechanical changes in the mixes were evaluated using non-destructive tests (Ultrasonic Pulse Velocity (UPV)) and destructive tests (crushing tests) on 28 day-long specimens consecutively, in order to assess CSF and CH replacement rate influence on the mechanical and physical properties of the mortars, as well as CSF-CH pre-mixing on the improvement of these properties. A significant improvement of the mechanical properties of the CSF, CSF-CH mortars, has been noted. CSF-CH mixes showed the best improvements exceeding 50% improvement, showing the sizable pozzolanic reaction contribution to the specimen strength development. UPV tests have shown increased velocities for CSF and CSH mixes, however no proportional evolution with compressive strengths could be noted. The results of the study show that CSF-CH addition could represent a suitable solution to significantly increase the mechanical properties of mortars.

**Keywords :** compressive strength, condensed silica fume, hydrated lime, pozzolanic reaction, UPV testing

**Conference Title :** ICCSBE 2019 : International Conference on Civil, Structural and Building Engineering

**Conference Location :** Vienna, Austria

**Conference Dates :** December 26-27, 2019