

Effect of Power Ultrasound on the Portland cement paste and mortar: study of chemical shrinkage and compressive and flexural strength development

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Effect of Power Ultrasound on the Portland cement paste and mortar: study of chemical shrinkage and compressive and flexural strength development [\[programme\]](#)

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Application of Power ultrasound (PUS) to the Portland cement mortar is the subject of this study to improve the kinetics of hydration and mechanical properties. The present work investigates the effect of direct PUS with various frequencies and power to the Portland cement paste and mortar mixtures. In regards to the mortars, two scenarios for PUS application were studied: 1) ultrasound treatment of the whole mortar mixtures and 2) addition of aggregates to the ultrasound-treated paste. The chemical shrinkages of cement paste mixes were measured over 14 days by developing an automated set up and using the image analysis technique. The mechanical properties of hardened mortar prisms were evaluated by studying the compressive and flexural strength development up to 91 days. The results show that lower frequency-high power PUS slightly changes the chemical shrinkage behaviour of cement pastes. The mechanical properties of mortars with the paste treated with the same PUS characteristic showed significant improvement in flexural strength both in early age and long term. The SEM micrographs of fracture surfaces confirmed improved interfacial transition zone between aggregates and cement paste in mortar samples.