

Enhancement of Dune Sand from the Western Erg (Algeria) in the Formulation of New Concrete

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Abstract : The southern Algeria is known for its huge sand dunes that cover part of its territory (Sahara). This sand has features that allow a glimpse of a recovery in the construction field in the form of Ultra High Performance Concrete (UHPC). This type of concrete using a large amount of silica fume, ultra fine addition that gives very high performance but is also relatively rare and expensive. Replacing it with another addition to equivalent properties, such as metakaolin, can also be considered. The objective of this study is to both enhance the sand dunes of Erg south west western Algeria but also reduce manufacturing costs of Ultra High Performance Concrete to incorporating metakaolin to instead of silica fume. Performances to determine mechanical performance are instantaneous, compression and bending. Initially, we characterized the Algerian sand dune. Then, we have to find a formulation of UHPC, adequate in terms of implementation and to replace silica fume by metakaolin. Finally, we studied the actual value of the sand dune. Concrete obtained have very high mechanical performance, up to a compressive strength of 250 MPa, a tensile strength of 45 MPa by bending with the method of heat treatment. This study shows that the enhancement of dune sand studied is quite possible in UHPC, and in particular UHPC bundles and the replacement of silica fume by metakaolin do not alter the properties of these concretes.

Keywords : Ultra High Performance Concrete, sand dune, formulations, silica fume, metakaolin, strength

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