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# Towards the establishment of formulation laws for sediment-based mortars

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## Abstract

The 21<sup>st</sup> century marks a remarkable stage of a widespread awareness for environmental protection and the preservation of natural resources. In this context, the beneficial use of dredged sediments as building materials really fits with this aim. There is currently no objective method for the formulation and strength prediction of sediment-based mortars. The consequence is that the results can be very variable and the test conditions are difficult to reproduce. The monitoring method involves formulating mortars with water/binder (w/b) ratios defined by:  $w/b = 0.4$ ,  $w/b = 0.5$ ,  $w/b = 0.6$ ,  $w/b = 0.7$  and  $w/b = 0.8$ . For each given w/b ratio, mortars contain increasing amounts of sediment in partial substitution to cement ( $p = 0\%$ ,  $5\%$ ,  $8\%$ ,  $10\%$ ,  $15\%$ ,  $20\%$ ,  $25\%$ ). By investigating the compressive strength of these mortars after 7, 28 and 60 days maturation, predictive and comprehensive models for the prediction of compressive strength of sediment-based mortars is proposed.

**Key words:** Sediment, mineral additions, resistance, formulation, substitution.

## Résumé :

Le XX<sup>ème</sup> siècle marque une étape sans précédente d'une prise de conscience généralisée en vue de la protection de l'environnement et de la préservation des ressources naturelles. Dans ce cadre, la valorisation des sédiments de dragage en tant que matériaux de construction rentre véritablement dans cette optique. Il n'existe, à ce jour, aucune méthode cohérente de formulation et de prédiction de la résistance des mortiers à base de sédiments. La conséquence est que les résultats peuvent être très variables et les conditions de tests difficilement reproductibles. La méthode proposée dans cette étude consiste à formuler des mortiers avec des rapports Eau/Liant=E/L allant de :  $E/L=0.4$ ,  $E/L=0.5$ ,  $E/L=0.6$ ,  $E/L=0.7$  et  $E/L=0.8$ . Pour chaque rapport E/L donné, des mortiers contenant des taux croissant de sédiments en substitution du ciment sont formulés ( $p=0\%$ ,  $5\%$ ,  $8\%$ ,  $10\%$ ,  $15\%$ ,  $20\%$ ,  $25\%$ ). En testant la résistance en compression de ces mortiers aux échéances de 7, 28 et 60 jours, il a pu être dégagé des modèles objectifs de prédiction de la résistance en compression de mortiers à base de sédiments.

**Mots clés :** Sédiments, additions minérales, résistance, formulation, Substitution.

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