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Recycled Cellulosic Fibers and Lignocellulosic Aggregates for Sustainable Building Materials

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Abstract : Sustainability is becoming a priority for developers and the use of environmentally friendly materials is increasing. Nowadays, the application of raw materials from renewable sources to building materials has gained a significant interest in this research area. Lignocellulosic aggregates and cellulosic fibers are coming from many different sources such as wood, plants and waste. They are promising alternative materials to replace synthetic, glass and asbestos fibers as reinforcement in inorganic matrix of composites. Natural fibers are renewable resources so their cost is relatively low in comparison to synthetic fibers. With the consideration of environmental consciousness, natural fibers are biodegradable so their using can reduce CO₂ emissions in the building materials production. The use of cellulosic fibers in cementitious matrices have gained importance because they make the composites lighter at high fiber content, they have comparable cost - performance ratios to similar building materials and they could be processed from waste paper, thus expanding the opportunities for waste utilization in cementitious materials. The main objective of this work is to find out the possibility of using different wastes: hemp hurds as waste of hemp stem processing and recycled fibers obtained from waste paper for making cement composite products such as mortars based on cellulose fibers. This material was made of cement mortar containing organic filler based on hemp hurds and recycled waste paper. In addition, the effects of fibers and their contents on some selected physical and mechanical properties of the fiber-cement plaster composites have been investigated. In this research organic material have used to mortars as 2.0, 5.0 and 10.0 % replacement of cement weight. Reference sample is made for comparison of physical and mechanical properties of cement composites based on recycled cellulosic fibers and lignocellulosic aggregates. The prepared specimens were tested after 28 days of curing in order to investigate density, compressive strength and water absorbability. Scanning Electron Microscopy examination was also carried out.

Keywords : Hemp hurds, organic filler, recycled paper, sustainable building materials
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