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D. Arturo Bustos García

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INFLUENCE OF THE GEOMETRY OF THE SPECIMEN IN THE MECHANICAL CHARACTERISTICS OF CEMENT MORTARS WITH FIBERS ADDITION

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INFLUENCE OF THE GEOMETRY OF THE SPECIMEN IN THE MECHANICAL CHARACTERISTICS OF CEMENT MORTARS WITH FIBERS ADDITION

[1]Arturo Bustos García; [2]Francisco González Yunta; [3]Alfonso Cobo Escamilla; [4]Esther Moreno Fernández

[1] Filiación 1er Autor: Escuela Técnica Superior de Edificación.
[1] Filiación 2º Autor y 3er Autor: Departamento Tecnología de la Edificación, E.T. S. Edificación.
[1] Filiación 4er Autor: Dpto. Construcción y Tecnología Arquitectónicas. E.T.S. Arquitectura.

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Cement based compositions are the most common materials used in construction due to their excellent properties and its possibility to alter themselves to satisfy the specific needs of a wide range of applications, varying the proportions of the basic components or by the use of additions. [1].

Basalt and carbon fibres have been used to improve the ductility of these materials since it increases its resistance against the spread of cracks, enhancing the energy absorption and deformation capacity, showing an improved post-cracking behaviour. [2-4].

These investigations do not study in depth the cracking process or the changes that it may arise in the geometry of the samples. However, is widely known the effect that the size and shape of the sample causes in compression studies, existing different expressions to connect the maximum load with the different geometries. [5].

With these premises, the target for this study is set: to investigate the influence of the shape and size of the sample on its mechanical properties, focusing on ductility, on carbon and basalt fibre mortars. In an initial phase, the mechanical properties of three mortars with different fibre percentage (0.66%, 1% y 1.33%) is analysed using samples which follow the standards. In a second phase, 1% mortars are characterized since they were the ones presenting the best results. To determine the influence of the shape, eight samples were examined, four to bending and four to compression.

The progressive inclusion of carbon and basalt fibres results in a weakening of the mechanical properties. This behaviour its due to the increase of occlusive air and to the fact that unless the fibre content is low (under 0.5%), the fibres are not as effective as additives to resist loads.

On the contrary, tenacity against flexion and tenacity indexes rise at the same time that fibre addition percentages increase. This is due to the good interaction between the cement mortar and the fibres, as seen in Fig.1.

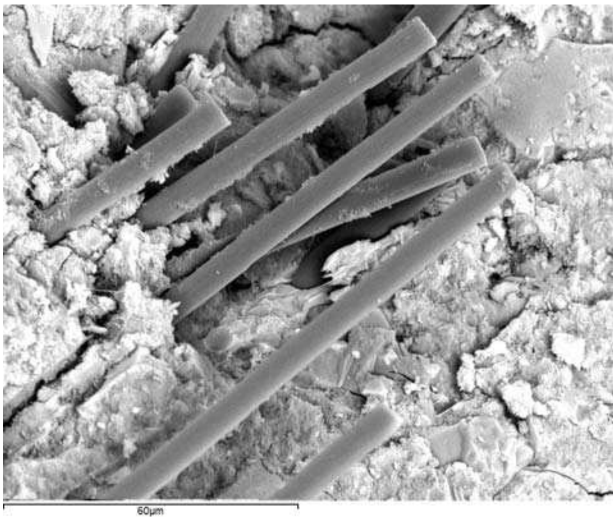

Fig. 1: **Backscattered electron image (BSE) of cement mortars with carbon fibers at 1000x magnification.**

Regarding geometry, the samples with a higher relation width/edge show higher tenacity against flexion due to the fact that fibres lay preferably in two directions, rising the number of fibres that cross the cracked section. Furthermore, the bigger and the slender the samples are, the weaker their capacity of absorbing energy would be against compression tests due to the preferential alignment of the fibres.

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