

Foam concrete made with micro and nano silica sand: Pore structure and properties

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Abstract. A study has been undertaken to investigate the possibility of using filler as fine aggregate, with different fineness and grading, instead of a conventional fine sand used in producing foam concrete. A conventional sand was replaced by micro silica sand and a comparison has been done to examine the pore structure and properties of investigated foam concrete mixes. Two ways were adopted to incorporate the nano silica sand into the mixture: with part of mixing water and with pre-formed foam bubbles. Compared to conventional foam concrete, it was found that using micro silica sand helped in improving strength (169%), reducing absorbed water (38%) and reducing shrinkage (40%) by enhancing both cement paste microstructure and pore structure. This pore structure enhancement was achieved by reducing pores merging leading to making a narrow pore size distribution and more circular pores with large spaces between them. On the other hand, increasing fineness of normal sand and using nano silica sand resulted in less enhancing in foam concrete properties compared with using the silica sand as its own (at micro level). It was noticed that incorporating the nano particles into mixture with foam bubbles was more effective than the conventional way; with mixing water