Density and phase determination of Portland cement mortar using X-ray computed tomography and X-ray diffraction

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The 3D distribution of the density of cementitious materials is of substantial interest in the development of new formulations and also in forensic investigations of construction damages. The mass density of the cementitious phases, gravel and sand and also for void distributions are an important starting points for modelling cement hydration or degradation processes of cement phases (1).

Hydrated cementitious phases of ordinary Portland cement pastes are only detectable in short-range order of crystallinity. To reveal the information on their structure and the porosity advanced methods has to be used (2).

Current combined investigations of density mapping and phase composition of hydrated cement paste and mortar at different water/cement ratios expose the 3D mass density distribution, the void distribution and the aggregate distribution as well as the summarized phase composition. The results can also be utilized for the investigation and modelling of strength and thermal conductivity.

Literature:

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